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Kantrowitz: Evaluating Technology
Lewis: The Engineer in Human Destiny
Averbach: The Technology of Golf



Technology Review

Red Rover
Do you want me to start, Jim?

Spider
Yeah, Rusty.

Red Rover
Okay, here I go.

Spider
Rusty, I want you to evaluate those
handles and when you get through
with that, I want a conclusion from

you on whether it's a practical way of
doing it, like we've already said it is.

Red Rover
Okay.

Spider
Stay away from the radar antenna.

Red Rover
Rog. Oh yeah, this is very good.

Spider
Yes. Hey, let me get that camera out.

Red Rover
Okay.

Spider
Anything left of that one?

Red Rover
Oh, running very good. This is no
problem at all.

Spider
Good. Be right there. Smile.



technology review

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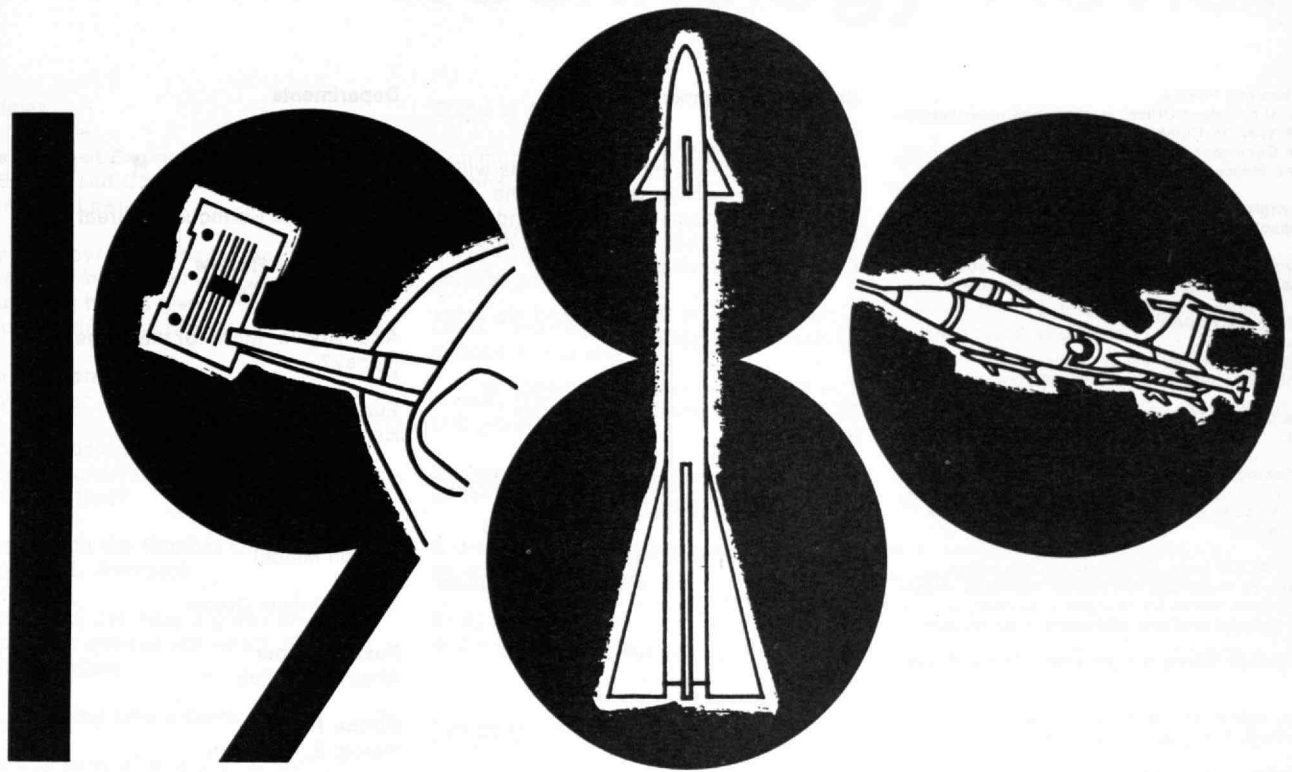
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Spring and Summer Reading

Two issues remain in *Technology Review's* 71st volume. The contents will include four essays relevant to the paper of the Russian physicist, Andrei D. Sakharov (*Progress, Coexistence, and Intellectual Freedom*):

A commentary on Sakharov and his times by Harrison Salisbury

The meaning to American science of Dr. Sakharov's message, by Isidor I. Rabi

A statement on the effects of technology on American culture by Daniel Bell

How one laboratory has refocused its effort in accord with national imperatives by Ronald F. Probststein.

In addition, *Technology Review* announces for its next two issues:

The limitations of weather forecasting by Edward N. Lorenz

The achievements in lunar photography which paved the way for Apollo by George T. Keene

A proposal for man-centered standards for technology by John P. Eberhard

The Cover

Russell L. Schweickart, Lunar Module pilot on the Apollo 9 flight, stands in the "golden slippers" at the beginning of his extravehicular activity period. "Boy, oh boy, what a view," he said, as Mission Commander James McDivitt made this photograph. (Photo: N.A.S.A.; cover design by Ralph Coburn, M.I.T. Office of Publications)

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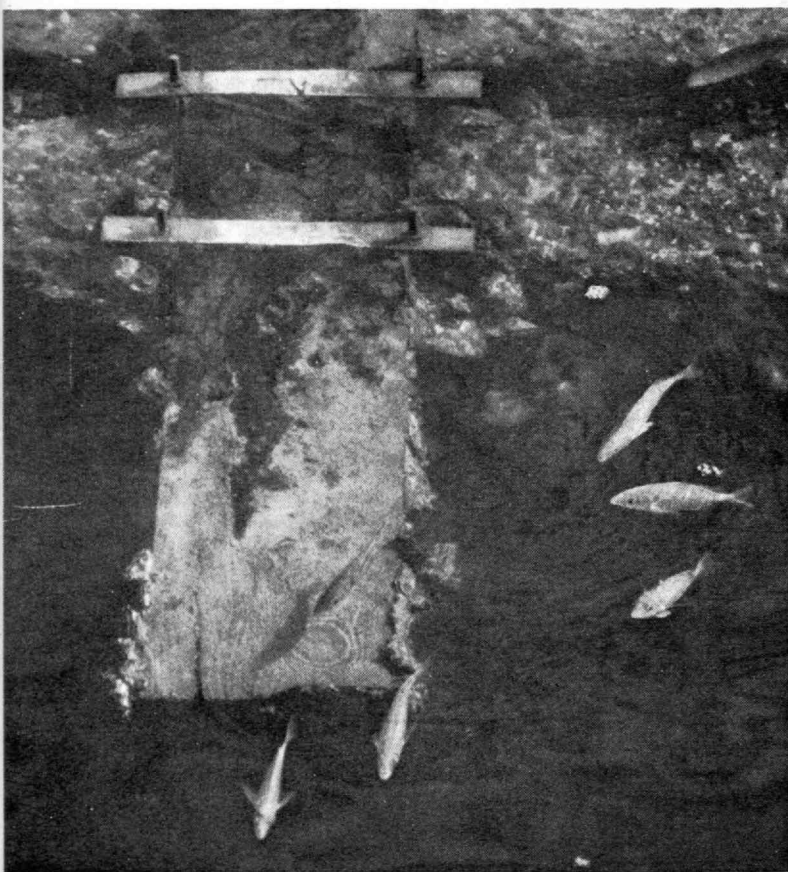
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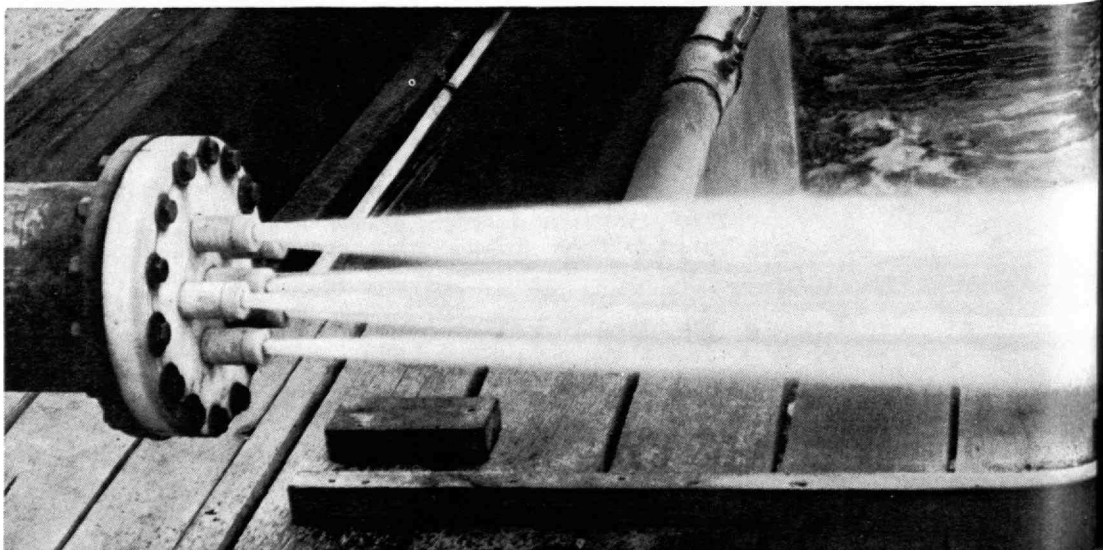
"I love the ocean bu

"See the stuff growing on this sample? The ocean attacks all kinds of ways. Rust. Rot. Worms. The teredo—it bores holes in wood structures. Some materials do all right under salt water but fail in salt air. Some are okay in still water but can't take flow. Barnacles grow on most materials. And so on."

"We have to test right in the ocean. Take those prestressed concrete samples. We want to see how long the steel reinforcing bars will stand up, as well as the concrete. You couldn't get the same results in a test tube or tank. The organisms would die. The chemistry would change. The ocean is a living thing. You have to test it right where it lives."



"This is a high-velocity test. Salt water doing ninety miles an hour. Inside those nozzles are samples of materials. Someday I'll see a hydrofoil skimming along at ninety and I'll think back when we proved out some particular nickel alloy and I'll feel a lot of satisfaction."



What an appetite!"

Leaky Davis of International Nickel's Corrosion Laboratory talks about testing materials against the ravenous sea.

"You should be here during a hurricane," says Davis. "I love the ocean but she can smash, crush, erode, corrode, clog...even bore holes. We're trying to put her on a diet."

Louis Thames "Leaky" Davis Jr. handles maintenance at America's largest ocean corrosion laboratory, at Harbor Island, North Carolina.

"We test metals, woods, plastics, platings, coatings—not just nickel alloys, thousands of materials. You'd be surprised, though, how often nickel wins.

"To work the ocean you have to know just what each material can do. Otherwise how could you build a desalination plant, or drill for undersea oil, or improve pleasure boats?"

Leaky showed up for a three-day welding job with Inco in 1947. "The third day hasn't come yet. We've done a whale of a lot. But there's still a lot to be done."

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Defusing the Earthquake Threat

The trouble with earthquakes is that people still take their ancient threat with more fear than reason.

Last March, for example, a California prophetess dreamed that a great earth shock split off part of the state, which then slid into the Pacific. She woke up to forecast this disaster.

Some people nervously laughed it off. Others panicked. The California Institute of Technology got a call from a distraught mother asking them to reason with her pregnant daughter. The girl seriously considered abortion. She didn't want to bring a baby into the world if her home were about to sink into the sea.

The fateful day, Friday afternoon April 4, passed without a tremor and the whole thing became a community joke. But the incident makes an interesting point. The prophecy was ridiculous and should have been treated as such. Yet within days of its issuance, most people in California and many elsewhere were talking about it.

Meanwhile, seismologists are wondering how to get across a far more important message. After millennia of helplessness before earthquake threats, man now is in a position to do something to soften their power. Given a decade of intensive research, seismologists could learn to predict many of the shocks. They could identify dangerous areas with some precision. Working with engineers they could develop much safer building standards. They might even find clues to defusing at least some earthquake threats as well.

Seismologists base their optimistic vision on a modicum of success in forecasting quakes and on the fact that man's folly causes more earthquake destruction than does nature's fury. Forecasting a quake would let officials take emergency safety measures. They could even evacuate unsafe buildings if necessary. And by learning what not to do in earthquake-prone regions, man could avoid in advance much potential devastation.

The Rising Cost of Quakes

When a quake series hit what is now New Madrid, Missouri, in 1811 and 1812, it produced the most widely felt shocks re-

corded in North America. One of them rocked a two-million-square-mile area stretching from the Rockies to the Atlantic and from Canada to the Gulf of Mexico. There was little to damage then. Were such a quake to strike now, it would wreak damage in many large Midwestern cities.

By contrast, the 1906 San Francisco earthquake killed 700 people and caused \$2.6 billion damages in 1966 dollars. Much of the destruction was caused by fires that raced through flimsy structures while firemen were hampered by broken water mains. In this case, the people were there to be killed in a city built in a way to assure maximum earthquake damage.

What a difference it would have made if San Francisco's builders had known what they were getting into in the first place. If they had known what kind of earthquakes to expect and how the local ground would respond to the shocks, they could have built more intelligently. And if they could have known approximately when a dangerous quake was likely, they could have taken necessary emergency measures in advance.

Last January, a working group of the Federal Council on Science and Technology (F.C.S.T.) called for a National Earthquake Hazards Program to give modern city planners the know-how San Francisco's builders lacked. The report warns that building is booming in quake-prone areas. It foresees tremendous damage potential. It forecasts that a giant earthquake in a region like Los Angeles or Seattle, a few years from now, could result in \$3 to \$15 billion damages. Yet, it says, seismologists now know enough about earthquakes to feel that this damage potential could be reduced by 25 percent within 15 to 20 years of the start of the recommended ten-year research program.

To get that knowledge, the F.C.S.T. wants the United States to triple its annual earthquake research spending, for an overall decade's cost of \$220 million. The program would map earthquake hazards region by region. It would find out how local ground would react to likely quakes. It would develop building design and zon-

ing requirements to enhance safety. It would also develop forecasting procedures.

Japanese Prediction

American seismologists are encouraged by Japanese success with earthquake forecasting. Earthquakes there often are heralded by changes in tilt of the land and by distinctive patterns of microquakes. Long term build up of rock stress that brings on earthquake conditions shows up in changes in leveling surveys. It may also alter the rocks' electrical and magnetic properties, to be reflected in changes in conductivity or the local geomagnetic field, but so far, neither Japanese nor American investigators have been able to identify reliable electromagnetic predictors.

When an earthquake swarm broke out at Matsushiro in 1965, Tokyo University's Earthquake Research Institute (E.R.I.) tried its hand at forecasting. A year later, E.R.I. scientists began issuing public earthquake forecasts along with the weather report. These warned of danger periods that usually ran to a few months' duration.

The forecasts were at least as good as those put out for long range weather conditions, according to E.R.I.'s T. Hagiwara and T. Rikitake. Now Japan is pushing a national quake forecasting program that includes frequent leveling surveys and seismic monitoring. Hagiwara and Rikitake say that experience so far makes them hopeful of reaching the goal of reasonably accurate forecasts.

But while scientists now expect to learn to forecast danger periods, they still don't know what triggers a specific quake at a particular time, once earthquake stress has built up.

Dr. C. Hewitt of Caltech suggests tidal forces may sometimes do the job. He notes that earth, sun, and moon were in line with the White Wolf Fault when a bad quake rocked California's Kern County on July 21, 1952. There's no single trigger for all quakes, Dr. Dix says. But in this case the tidal forces were oriented to put maximum compressive stress on the epicentral region of the main shock.

Man's own works may also set off quakes. J. P. Rothé, Secretary-General of the International Association of Seismology and Physics, has documented cases of quakes apparently set off by dam construction. Perhaps the weight of water upsets local equilibria. It can run to several billion tons behind a large dam. Maybe water seeps deeply underground along cracks to lubricate rocks and facilitate slippage. The U.S. Geological Survey blames Denver earth tremors on such lubrication. They followed injection of chemical wastes two miles deep at the Rocky Mountain Arsenal.

Lubricating Nature

Louis C. Pakiser, chief of the Survey's National Center for Earthquake Research, says this suggests "the possibility of earthquake modification and control by deliberately injecting fluid into certain fault zones to cause relatively harmless fault creep, accompanied by perhaps moderate earthquakes. . . . Conversely, one might strengthen an active fault zone, as at Denver, by withdrawing fluid to reduce the pore pressure, and thus stop the earthquake sequence."

Merely forecasting quakes, or even Pakiser's simple type of control, won't do much good by itself. Earthquake knowledge has to be translated into effective zoning and building codes.

At Caltech, Dr. George W. Housner has a computer program that will simulate the effects of many types of quakes on a proposed building design. In this way, he says, buildings can be designed to be quite safe even in an earthquake-prone area. The problem now, he says, is to learn enough about local ground conditions in construction areas to do this kind of designing. His program assumes knowledge of how the ground under a building will react to quake stresses. There's nothing you can do to safeguard a building if the ground is going to slide from beneath it.

Such local ground conditions can be critical, as the 1964 Good Friday earthquake in Alaska showed. Much damage in that disaster came when unstable ground gave way beneath buildings. At White House request, a National Research Council committee has made an ex-

haustive study of that earthquake. The first book of an eight-volume report, released in March, emphasized some of the hydrological side effects also.

A summary of this, in the N.R.C. News Report notes that "frozen lakes shattered, giant landslides spread over large glaciers, and snow avalanches plunged down steep mountain slopes. Human significance, however, lies in the less spectacular: in the compaction of underground reservoirs, causing diminution of community water supplies; in the hazard of landslides in valleys once filled by glaciers but now occupied by man; and in the damage to lake shores and lake facilities."

As this illustrates, every earthquake-prone area will have its own unique hazards built into its regional geology. And very few areas in a country like the United States are fully safe, as the New Madrid quake in the relative seismic quiet of the Midwest shows.

The N.R.C. report backs up the Federal Council in calling for monitoring of earthquake danger areas and wide-ranging research to develop the potential for forecasting and for gaining new building knowledge that seismologists now see. It suggests this be included in an all-embracing national program to reduce destruction from many kinds of natural hazards—floods, landslides, hurricanes, volcanic eruptions, and so forth. By including earthquake research in this broader program, the N.R.C. would hope to overcome public apathy, which tends to consider quake dangers a special problem for only a few states.

Thus, in quick succession, two reports from top scientific bodies point out that man can alter his relationship to the ancient threat of earthquake disaster. If he backs adequate research now, he can soon do much to reduce that disaster potential. No longer need he resign himself fatalistically to the whim of Poseidon (who was god of earthquakes as well as of the sea). Government seismologists now are trying to sell this kind of research to Congress. But so far their efforts have received far less publicity than the irrational visions of that California seer.

Robert C. Cowen, who studied meteorology at M.I.T., is Science Editor of the Christian Science Monitor; he is a past President of the National Association of Science Writers.

After Apollo: More for the Same Money?

The events of the first 10 years of the space age were exciting, particularly because everything was being done for the first time. The experiences of the next 10 years are likely to be richer still, profiting from the maturity of machines and procedures that has been achieved.

After 1957, men flew into space and learned to maneuver there. Satellites began regularly photographing weather patterns, transmitting telephone conversations and television programs, and serving as navigation references for ships at sea.

Other satellites told of a vast region of trapped particles around the earth, photographed the moon close up and landed on it for preliminary tests of its surface composition, and flew near Mars and Venus to tell us that these planets with a density similar to Earth's both lacked the magnetic field of this planet and had atmospheres of quite different composition, that of Venus being 100 times thicker and Mars' 100 times thinner than Earth's.

Rockets and satellites opened up vast new fields of infrared, ultraviolet, and x-ray studies of the sun and stars.

Such events have begun to teach men to live in a new territory of the imagination, much as Europeans began to do 500 years ago after Columbus had stumbled upon America. Only a few will ever go into space but the mere fact that those few travel there will create revolutionary changes of attitude in the rest of us. Although this may open new sources of conflict, older ones may fade.

The Coming Decade

During the next 10 years, at least these four advances in space may be looked for:

1. More and more elaborate manned stations will be constructed in orbit around the earth, and individual men will extend their stays from two weeks (the maximum so far) to a month, then two months and longer. As the men do this, they will be answering the medical question of how long men can live in space without requiring artificial gravity, and hence, how elaborate a spaceship making a two-year voyage to Mars must be.

2. Building upon the knowledge of how to reach the moon and return to the earth, men will explore enough scientifically interesting areas to give a good idea of the moon's origin and history. While they do this, they will be proving out some of the techniques necessary for long-term scientific occupation of a base on another heavenly body.

3. An increasing number of unmanned scientific packages will travel to most of the members of the solar system, providing at least crude photographs of them and answering such questions as whether life exists on the surface of Mars, the most likely candidate.

Two Russian probes have been launched toward Venus this year, and two American ones are scheduled to reach Mars around August 1. The United States plans a pair of Mars orbiters in 1971 and a pair of small Mars-landing packages in 1973. A spacecraft to photograph Venus is to gain momentum from that planet's gravitational pull and whiz on to Mercury. Probes will push through the asteroid belt toward Jupiter, opening the door to launching a so-called "grand tour" satellite in 1977-78 on a 10-year voyage to Jupiter, Saturn, Uranus and Neptune, using the gravity of each planet to whirl it on to the next.

4. Meanwhile, closer to Earth, the technology of communications satellites will advance to the point that direct broadcasts from space to home screens will be feasible, opening the door to national television in developing nations like India and China and to the end of illiteracy.

To make such programs meaningful, space agencies such as the American N.A.S.A. will have to strengthen their sometimes loose ties with the scientific community. Many steps in this direction have already been taken through holding summer studies of goals for early and advanced lunar and planetary exploration, strengthening the membership of such bodies as the Astronomy Missions Board, appointing scientist-astronauts and soliciting from scientists in one or more laboratories proposals for entire satellites and not merely individual experiments to ride in "buses" provided by N.A.S.A.

Towards Science

In general, as space navigation becomes more mature, scientists are going to expect space agencies to move away from a silk-scarf, test-pilot orientation toward emphasis on scientific exploration. This is not going to be an easy process, as anyone who has witnessed the continuing difficulties of the U.S. Navy and the National Science Foundation in exploring the Antarctic continent can testify.

In the more advanced space programs of the 1970's, however, the role of the engineer will hardly become less important. There will be particularly demanding jobs for electronic engineers.

It does not matter whether the spacecraft is an active-broadcast communications satellite, a space station with several men moving around in it operating a telescope and medical experiments, a scientific package floating toward Jupiter, or a vehicle exploring the moon. The on-board power, data-handling and communications bandwidth problems will be formidable. There will have to be new types of antennas, much more use of highly miniaturized, power-saving electronic switches, and a rigorous selection of the data to be transmitted.

The historic pictures of Mars sent back by Mariner IV in 1965 took many hours to transmit at the rate of 8.3 bits per second. The pictures from the 1969 Mariners—which will include the first close-up photos of the planet's entire disk—are to be sent back at the rate of 270 bits each second, unless the 210-foot dish antenna at Goldstone, Calif., is not tied up with a manned lunar landing, in which case a bit rate of 16,200 is possible. The improvement of three orders of magnitude is impressive, but much more will be needed for true television from the surface of Mars. It should be noted that "high bit rate" of transmission from Apollo spacecraft to the Manned Space Flight Network of ground stations is 51,200 per second.

Such a picture of the future of space flight may well shock the large numbers of people who have become accustomed to violent rhetoric attacking the space program as a colossal misdirection of resources. Many who feel this way have

assumed that the completion of a single manned landing on the moon, perhaps as early as July, marks a turning point where it would be possible to reduce the budget of N.A.S.A. to half or even a quarter of its present total of about \$4 billion a year.

The practical and emotional reasons why this option is unlikely to exist are many. Some of them will be reviewed here.

Apollo's Resources

One minor point should be recognized. The \$24 billion Apollo program includes funds for no less than four lunar landings of the sort which the Apollo 11 crew of Neil Armstrong, Michael Collins, and Edwin Aldrin is scheduled to attempt this summer. The rockets, the spacecraft, and the scientific experiment packages are all in advanced stages of readiness and the Kennedy Space Center in Florida has ample capacity to launch Saturn V moon rockets every two months.

A second point is that even though the N.A.S.A. budget has been declining—more through action in Lyndon Johnson's White House than cutting by Congressional committees or floor action—a significant beginning already has been made on the so-called Apollo Applications Program (A.A.P.) of lunar exploration and earth-orbiting space stations.

In the N.A.S.A. budget for the 1970 fiscal year, the last submitted by President Johnson and providing for spending \$400 million below that of the current year, there is \$340 million for Apollo Applications. The reason that Apollo Applications can get so much new money even while the budget declines is that spending on the Apollo lunar landing program has been declining rapidly for several years.

The name of the A.A.P. program gives an indication of why its estimated cost is so low: it builds upon the investment already made on the Apollo program.

This investment includes some \$7 billion spent on developing Saturn rockets—one stage of which was the construction of 12 so-called Saturn I-B vehicles of which only five have been flown—and \$4 billion on ground facilities.

By spending an additional \$1.5 billion over six or more years, N.A.S.A. planners estimate, they will be able to buy no less than five missions which will construct a space station equipped with an array of solar telescopes (including some built by American Science and Engineering and the Harvard College Observatory).

Building a Space Station

The process begins in 1971 with the launching atop a Saturn I-B of a so-called S IV-B rocket stage (the sort which sends Apollo astronauts out of earth orbit and on their pathway to the moon) which has been equipped with a special air-lock and a Multiple Docking Adapter. Once in orbit, the S IV-B discharges whatever is left of its liquid hydrogen fuel—thus freeing an immense tank in which the main part of the space station can be constructed.

Almost at once, the Docking Adapter on the spent rocket stage is joined by three astronauts in the Apollo Command and Service Module, one of those originally built for lunar landing missions but since altered to include upgraded fuel cells, more liquid oxygen and hydrogen for its fuel cells, more fuel for its steering rockets, and a supply of nitrogen gas to create an oxygen-nitrogen atmosphere at five pounds per square inch in the space station.

During three days, the astronauts set up the walls, floors, ceilings and equipment of the space station inside the 10,000-cubic-foot volume of the spent hydrogen tank. Then they settle down for 25 more days in orbit before returning to earth. Later that year, a second group of astronauts, probably again including a physician or physiologist from among the scientist-astronauts, will join with the space station for a 56-day stay.

In 1972, the fourth and fifth flights of the A.A.P. series are scheduled to take off from Cape Kennedy. One will carry the third set of astronauts to use the space station, this time probably including an astronomer like scientist-astronaut Karl Henize.

The other flight will be an unmanned package with a shape somewhat like that of the Lunar Module portion of the Apollo moonship. The upper part of the package will be a pressurized control room, and the lower will contain the Apollo Telescope Mount, the array of solar telescopes. The unmanned package will also carry a set of accordion-folded solar panels.

During a 56-day stay, the astronauts will operate the telescopes and answer the question of how much they can move around in their space station without affecting the A.T.M.'s pointing accuracy. The conversion of Command and Service Modules for these flights has begun, and so have the fabrication of the Docking Adapter, the air lock and the Apollo Telescope Mount and its telescopes.

All of this work, about which there has been rather little publicity, constitutes an important commitment to manned exploration in the 1970's. Support for it is strengthened by the Soviet Union's apparent emphasis on construction of space stations in orbit around the earth.

This commitment was made in the face of declining N.A.S.A. budgets and in the face of increased public questioning of the goal of a manned lunar landing. Moreover, it was made before the landing.

With each Apollo mission—a test of the Command and Service Modules in earth orbit, a flight into and out of lunar orbit, a flawless series of tests of the Lunar Module above the earth—the chance of a safe landing on the moon increases.

Explosion of Enthusiasm

Therefore it may be safe to cast the mind forward to what people may be thinking

when the first men to set foot on another heavenly body return to "the good Earth." The effect on public opinion all over the world is likely to resemble an earthquake. The explosion of enthusiasm may be unexampled.

Such enthusiasm is almost certain to be of immense political value to the Nixon administration, whose freedom of maneuver is restricted sharply by a cross-chop of national frustrations. It is highly unlikely that the Nixon administration will decide, in the face of a successful lunar landing to cut back on the space program with all the hope and pride it brings. Nixon recognized such feelings amply in his inaugural address.

This does not mean, however, that Nixon will feel obliged to open the coffers to the space engineers. On the contrary, he is likely to adhere to Dr. Lee DuBridge's formula that while the nation will stick to its commitments in space it will not embark on a vast new program such as an expedition to Mars.

The implications of such a decision are that the N.A.S.A. budget will remain somewhere near the present level of \$4 billion a year with allowances for economic inflation. Within such a budget can be accommodated the Apollo Applications Program, lunar surface exploration, a bigger effort at scientific probes of the planets, and an expansion of applications satellite technology.

It is a simple decision. It can be painted as liberal or conservative. It maintains the space industry, which is a powerful constituency, at something near its present size. It avoids serious conflict between the space budget and the needs of expanding social programs. And it ensures a continuing flow of the emotional benefits of successes in space by individual men with whom all can identify.

It does something more. It maintains an alternative focus for the ambitions of aeronautical and electronic engineers in universities and the military services as well as in industry. If it had not been for the space program, all these energies would have focused themselves on the construction, at a much more rapid pace than has prevailed during the 1960's, of vast new defense systems. The feeling is quite widespread that most of these new systems, such as the anti-ballistic missile system which President Nixon has modified, tend to de-stabilize the balance of terror which now exist between the United States and the Soviet Union and hence to threaten the prospects for enduring peace.

A symbol of this peaceful focus of adventures in space is the fact that many of the astronauts are military men. All three of the men who read from the first chapter of Genesis in lunar orbit on Christmas Eve are serving military officers.

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The Science Gap

Europe, the cradle of modern science, no longer leads the world in scientific endeavor. The reasons, myriad and complex, are woven into the fabric of university structure and finance, the lack of an entrepreneurial attitude and of mobility among research people, and unbalanced or immature national science policies. The educational function of European universities must also be considered, since it is impossible to separate today's science effort from yesterday's educational input.

The existence of a science gap is not a new idea, but other gaps, technological and managerial, have been hogging the publicity of late. As these more immediate problems are sorted out, the more basic, background, fundamental research gap will assume greater importance and begin to receive the publicity. The science gap was recognized by the O.E.C.D. (Organization for Economic Cooperation and Development) in a report, "Fundamental Research and the Policies of Governments," presented to the Second Ministerial Meeting on Science in Paris in February, 1966. That report spoke grandly of the need and benefit of more research, the conditions for its development, and the role of the governments. It went on to describe the difficulties attendant to such research programs in Europe and to submit proposals to remedy the situation. The authors believed the main difficulty was inadequate organization of scientific research and training in Europe, coupled with the hierarchical nature of European universities. Accordingly, their proposed solutions were sweeping in nature and thus rather rich for the ministerial blood. Naturally, then, the ministers reacted characteristically by deciding to take no action then, to commission another study (and pray that the proposed solutions would be more palatable), and to schedule another meeting.

Joseph Ben-David, Professor of Sociology at the Hebrew University, Jerusalem, was invited to make the new study. Ben-David is a specialist in the history and evolution of educational institutions in Europe and the United States. His report, "Fundamental Research and the Universities, Some Comments on International Difference" was published by

the O.E.C.D. in March, 1968, at the time of the third Ministerial Meeting on Science (and the technology gap). Again, no action.

I have been visiting and reporting on research in European universities on a regular basis for nearly two years. In what follows, I propose to discuss Ben-David's paper in the light of my own observations. My judgment is that Ben-David's comments are fair and to the point. It must be appreciated, however, that the assessment of a fundamental research gap is not nearly as straightforward as is the assessment of a technology gap. Thus, much of Ben-David's paper and my observations are subjective: even so, I feel that the weight of the evidence is there.

Measures of the Difference

Our first step is to show that a gap exists. Basic research is concerned with creating or uncovering new scientific knowledge. Publication is an intimate part of that process. Furthermore, a large percentage of fundamental research is accomplished by scientists-in-training. As well, the results of research are in many cases translated into useful processes and patents. These three criteria, publication rates, student enrollments, and patents—while not unequivocal—can at least be used to show trends.

Ben-David points out that investment in both science and education is higher in the U.S. than in Europe. We have a much larger stock of trained manpower as a result, and in addition that stock has been augmented by the brain drain for some years now. These people are all fully employed, and the net result is a tremendous amount of research. It used to be thought that all the quality work was being done in Europe, but that is certainly not so today—and it has not been so for about 30 years.

The facts are simple. Price's analysis of the total world output of papers indexed in *Chemical Abstracts* since 1910 shows that the U.S. share has increased from 20 to 30 per cent in that time. In the same period the British Commonwealth has contributed a near steady 15 per cent, France's contribution has dropped from 12 to 4 per cent, Germany's share

has plummeted from more than 40 to about 5 per cent, while Russia has improved her output from 2 to about 20 per cent and Japan from 1 to about 10 per cent. This sample constitutes about 20 per cent of the total scientific literature; sample counts in other international journals give roughly the same story.

Such statistics do not consider quality, which is very difficult to assess. The distribution of Nobel prize awards may give some insight here. In the first half of this century Germany, Great Britain, the U.S., and France collected 39, 31, 27 and 16, respectively. For the following 16 years the numbers became 7, 18, 44 and 4, respectively. The tide had turned.

Ben-David considered the useful results of research, both fundamental and applied. His analysis indicated that in 1961 the U.S. received nine times as much in royalties and licensing of patents as we paid out. We were the only O.E.C.D. country with a positive balance in this area. In 1965, U.S. inventions amounted to nearly one half the world total. Finally, an analysis of 50 major inventions which were developed into final products shows that the U.S. was wholly responsible for initiating 38 per cent and for developing 44 per cent; no other single country did as much as one-third of our figure. We also played a role in the invention and development of a great many jointly developed products.

I have not attempted to digest all of the data presented by Ben-David; the trend, though, is fairly clear. He concludes that by 1920 our system of scientific research was growing more rapidly than that in Europe, and in the decade of the 1940's the U.S. assumed world leadership in fundamental science.

Old Organizations in New Conditions

For every effect there should be a cause. Ben-David attributes this one to the fact that the organization of higher education and research in Europe has not been changed since about the mid-Nineteenth Century—and that the nature of scientific research has changed. He cites two mileposts from nineteenth-century Germany. First, that the introduction of laboratory training in university organiza-

tions radically affected the elapsed time between the inception of ideas and the experimental determination of their significance and implication. The development of aniline dyes and the bacterial causation of illness were two of the immediate successes of this new kind of research organization. Second, this new laboratory structure outmoded the classical divisions of science. A team approach to a problem meant that each member became more of a specialist, and through this the rate of knowledge accumulation in the subspecialties became equal to the former rate for the broader science. In times of great change, the configuration of a discipline is not important, *per se*; the important thing is what can be done with it. But the entrenched academic organizations of Western Europe did not consider the requirements of research, but rather the requirements of teaching. The intellectual disciplines stable in Europe even today are defined according to their range and content about the beginning of the last century. Each discipline in that tradition is represented by a single professor who is supposed to be its master. This may have been possible 100 years ago, but it is so no longer.

Ponder the point a minute! Is it possible today for one man to master all of chemistry, physics, or any other of the classic disciplines (or even many of the neoclassic ones—look at how fragmented electrical and mechanical engineering have become)? How well can one man represent a complete academic discipline over a period of 20 years? This is the crux of the problem and of the difference between the European "chair" and the U.S. "department"—a department head represents his department, not the entire discipline.

In his paper Ben-David also points out that few changes have been made in Europe in 100 years, while a compromise position has been adopted in England. In France and Germany university and non-university research institutes were formed to handle specialized research tasks. In both cases extreme care was taken to protect the vested interests of the academic hierarchies; the research institutes do not have quite the same power and prestige as does the autonomous professor. In Britain, the system is not quite so rigid; the university department is both a "chair" and an "institute," and research in complex and changing fields may be handled more easily.

The Funding of the Elite

Two more factors are of prime importance in assessing the differences between Europe and the U.S.—the sources of funds and the status of members of a department relative to that of the professor. In Germany the holder of the chair receives a total grant each year from the state; it must cover the costs of salaries, equipment, etc., for his entire department. Generally the allocation is stable year after year—a fact which has advantages in slowly moving fields but tremendous disadvantages in new and

changing areas of science. In France, the universities are essentially arms of the government—their autonomy has been severely limited. Innovations in research or teaching originate only in the central government. The student unrest of the past year is directly traceable to the lack of change so characteristic of the French system.

Britain again is somewhat of an anomaly, being about halfway between Europe and the U.S. In Britain, the entire direct support of the universities comes from the government in quinquennial grants. However, after providing the funds and broad goals (consistent with national science and education policy), the government stays out of the picture. In addition, there are a number of further sources which can be tapped for research funds—though there is nothing like the proliferation of sources operating in the U.S.

There are a number of other factors which we could consider fully if we had the space. One is the fact that until too recently university education was available only to the few elite with either extreme brilliance or appropriate heritage. Another may be that the narrowness of the typical European course of study fixes rather rigidly the range of usefulness of the graduate. Still another might be to consider the inadequate and innovation-stifling reward system (again mainly on the Continent) under which the professor receives all the credit for everything which comes from his department and the greater his reputation, the more a scientist must "pay" for the privilege of basking in the reflected glory.

By contrast, the development of U.S. universities looks very different. Perhaps the root of the difference is that they are essentially non-government bodies: enterprise at all levels carries its own rewards. Second, the really good American departments are large, rather loosely structured groups compared to the very tight pyramids typically found in Europe. This lack of hierarchy has an immediate influence. Rank is not related to ability in science and near equals accomplish more together than can an aging, dogmatic professor and his bright, young, but deferential colleague. Another broad benefit related to both the previous points is that the individual U.S. professor is an entrepreneur; he finds his own students and his own research problems, and he solicits his own support from the multiplicity of available sources. Thus he stands or falls on his own merits. Finally, there is the overall U.S. attitude toward education, which I may summarize as follows: higher education for everyone capable of benefiting from it and for every purpose for which it is useful. Another important aspect is that U.S. universities change and create curricula and organizations to meet changing demands, while European universities have remained relatively static.

Effectiveness and Expenditures

Ben-David summarizes the differences

by saying that the research gap is due to the failure of Western Europe "to develop adequate research organizations and effective entrepreneurship in the exploitation of science for practical purposes and in obtaining resources for research. Considerations of status and privilege prevented the transformation of the role of the professor into a position within an organized division of research and training everywhere in Western Europe outside Britain. This created a barrier to mobility between academic and other research roles and a status gap which has proved detrimental to scientific cooperation. This, combined with government responsibility for fundamental research and higher education, stunted—or in Britain seriously limited—the development of scientific entrepreneurship."

Why has Europe failed in this respect? Ben-David examines the state of science expenditure in Western Europe and makes a point which, to me, is far more significant than his previous effort. He compares the type of research performed in the U.S. and in Europe and shows that the approach and attitudes are very much different. He finds that in the U.S. (in 1963-64) basic and applied research accounted for 34.5 per cent total research expenditure, and 65.5 per cent was spent for development. The same statistics show that every other O.E.C.D. country spent between 51 and 63 per cent on fundamental studies. The pattern is significant; Europe is doing more than its share of research, but it is not using the results!

These differences in spending patterns reflect a basic difference in philosophy and attitude on the uses and significance of fundamental research. In Europe new scientific information is not very widely used, so investment in applied research and production is neither necessary nor worthwhile. Yet the countries are still compelled to spend on fundamental science, in spite of the burden to the economy, in order to keep pace with new developments. Europeans have an idealistic attitude toward science and have always criticized the American dollars-and-cents philosophy.

It all depends on how one looks at science. In Western Europe research is cultural consumption; in America it is a social overhead. Perhaps it is no longer important how America managed to arrive at a different attitude than did Europe, but only that we did. Idealistic, cultural consumption or an economic investment; you pay your money and. . .

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The American Dream

The Urgent West

Walter Allen

New York: Dutton, 224 pp., \$5.95.

During the Thanksgiving season, citizens of Plymouth dressed in costumes of rough homespun serve doughnuts and hot apple juice to tourists visiting the Plimoth Plantation, a reconstruction accurate to the last knothole, while in the harbor a replica of the *Mayflower* lies at anchor, as if she had just made the westward crossing. In any season throughout the country, bronze plaques on monuments, on the walls of old houses, in the streets, and even in the fields beside the highways, guide the traveler backward to earlier times.

Americans who, when they turn their minds from the immediate present, are more likely to be concerned with the future than the past, are nevertheless intrigued with the history of America. It is true, but not very useful, to note that Englishmen, Frenchmen, Italians—all people, to some degree—are also interested in their origins. The American involvement with history is significantly different.

How old is Jerusalem? Athens? Was Rome founded in the Bronze Age or the Early Iron Age? When, precisely, did Lutetia become Paris and London arise from a Roman settlement? The history of ancient beginnings is fragmentary, remote, impersonal, pertaining hardly more to present inhabitants than to people everywhere.

The United States is the oldest independent country in the Western Hemisphere, with the oldest written constitution in the world. Nevertheless, its independence is not quite two centuries old. The last veteran of the Revolution died during our grandfathers' days, and the last soldier of the Civil War may well have survived into the lifetime of anyone over thirty. On this scale, history is almost current. It need not always be deduced or guessed; it can be known. It was precisely the 21st of December, 1620, when the *Mayflower* sailed into Plymouth harbor, with a crew and passengers whose names were recorded in writing. We can trace lines in space and in time—Einsteinian world lines—from

Plymouth, from Jamestown and New Amsterdam, across the continent from ocean to ocean, and from then to now, and from them to us. Our involvement with history is close and personal. It is not only for the sake of the past, however; it serves a purpose beyond illuminating the roads by which we have come.

In Robert Penn Warren's *Brother to Dragons*, Thomas Jefferson recalls that he once wrote "That the dream of the future is better than the dream of the past. Now I should hope to find the courage to say That the dream of the future is not Better than the fact of the past, no matter how terrible. For without the fact of the past we cannot dream the future."

Walter Allen, the English critic, looks at American history and literature in *The Urgent West*, exploring their reciprocal relationship to the American dream.

The book begins with a 90-page history of the United States from the first permanent settlements to the end of the Reconstruction period. It is a special kind of history, not political, economic, social, diplomatic, nor military. Mr. Allen assumes that the reader is reasonably familiar with facts and chronology. His intention is to uncover the aspects of the American experience relevant to the question: What is an American? In such an enterprise, the answer and the process of seeking it are often of equal importance.

The Frontier in American History

It is only a slight simplification to describe Mr. Allen's approach as an extension of Turner's thesis of the role of the frontier in American history. Movement has always been westward: across the Atlantic, at the beginning and in later waves of immigration; then in stages from the coast settlements over the Appalachians, through the Great Plains to the Rockies, and finally to the Pacific. If there were religious, economic, or political compulsions, or simply the feeling that houses were too close together, a man could move on. The frontier was a flexible boundary that could be pushed back—until inevitably it disappeared, geo-

graphically, toward the end of the Nineteenth Century. It has remained in the memory, to be revived in atavistic impulses, like the migration of the Okies in the 1930's.

As a consequence of the existence of the frontier, all Americans are descendants of displaced persons—whether Puritans or Huguenots escaping from religious persecution, or Irish escaping from famine, or Jews escaping from Russian pogroms and German gas chambers, or Europeans of many nations escaping from fascist and communist totalitarianism.

A second consequence is the lack of definable national identity. This is hardly surprising. On the scale of history, the melting pot has been on the fire too short a time.

For some Americans, the time has been long, too long. To almost everything that has been said, or that follows, they constitute exceptions. Black people did not cross the Atlantic as refugees; they came as slaves in chains. For them, there was no frontier: beyond the boundaries of the plantation were dogs and whips; beyond the slums of northern cities were hunger and discrimination.

Yet Americans, regardless of the color of their skins, are recognized as Americans by each other and by the outside world. How is that possible? What do they have in common, despite their great national, ethnic, and religious diversity? What does it mean to be an American?

Redefinitions of the Dream

The fundamental unity arises from the belief in a dream that was first stated by Thomas Jefferson in 1776 and is still, Mr. Allen points out, "as revolutionary in its implications as it was almost two hundred years ago."

"We hold these truths to be self-evident," declared the thirteen United States of America, "that all men are created equal, that they are endowed by their Creator with certain unalienable Rights, that among these are Life, Liberty and the pursuit of Happiness."

The statement is magnificent in its breadth and simplicity, but hardly a guide

for action. The American dream must be defined anew in each generation. That is to say, each generation must determine what it means to be an American. In large part, this search for identity has been the subject of American literature.

Mr. Allen refers sketchily to many writers but discusses in detail "the founding fathers of American writing:" Cooper, Hawthorne, Emerson, Thoreau, Poe, Whitman, Twain, and Emily Dickinson.

Cooper and Hawthorne complained that the poverty of American civilization made it impossible to write novels like those of Fielding, Scott, or Trollope, crowded with people in a dense, fully depicted society that was, in fact, the major influence acting on characters. And so they write, not novels, but "romances" about characters that seem realistic yet are somehow mysterious. Cooper's *Leatherstocking Tales* and Hawthorne's *The Scarlet Letter* are more alike than may at first appear.

In both, the emphasis is on man rather than society; the characters are moved and changed by internal forces. People, objects, events are symbolic, often in shifting images. Hester Prynne's scarlet A stands for adultery, but those she later helps interpret it as "able," while it also conceivably stands for art. In Natty Bumppo, Cooper created a mythical hero, of whom it is possible to find reflections in Huck Finn, some of Hemingway's heroes, and the Gary Cooper hero of Western films.

Melville's *Moby Dick* is consciously pitched at epic magnitude, enriched with levels of symbolic meaning in every detail, from the melting pot of a crew (America? the world?) to the whiteness of the whale. *Moby Dick* may not be the greatest novel of the Nineteenth Century—Tolstoy, Dostoevsky, Dickens, and Hardy were Melville's approximate contemporaries—but it could have been written "only by an American and at that point in American history."

The symbolism that Hawthorne and Melville practiced as an art, Emerson turned into a principle of his own system of Transcendentalism, while Thoreau turned symbols into acts, going to prison for refusing to pay taxes to a government whose policies he thought unjust, and later retiring to Walden to "live deliberately, to front only the essential facts of life."

Whitman put himself forward as the representative American and his poetry as expressive of the spirit of America. Certainly the exuberance of his feelings and language are reminiscent of the exaggerations of the western frontiersmen and their larger-than-life folk heroes. In any event, whether through his person or his writing, Whitman brought American poetry into world poetry.

So did Poe, but only among such French poets as Baudelaire and Mallarmé. English critics appreciated his horror stories, so mysterious in the Gothic man-

ner, and the two forms he invented—the detective story and science fiction.

Mark Twain's reputation rests on *The Adventures of Huckleberry Finn*, which would be a remarkable book if only because its protagonist is both good and believable. In a world of violence and evil, Huck remains uncorrupted and free by virtue of his detachment from society. Therefore, at the very end, he must "light out for the Territory . . . because Aunt Sally she's going to adopt me and civilize me, and I can't stand it. I been there before—"

A Dream—How Far Unrealized?

What do the pioneers of American writing seem to be telling us about the American dream and about what it means to be an American? Society is at best dull, they say, and always a danger to freedom. Under such circumstances, self-reliance is not only a virtue but a necessity. Light out for the Territory, if you can. But the frontier is now interior, symbolic, so that the relation with human institutions is through symbols.

Perhaps a clue to understanding is hidden here. It is not to be expected that the American dream should be fulfilled completely. It is, after all, a dream. But it falls very short of realization. Many of the recent writers whom Mr. Allen considers only briefly have chosen to depict the failures of the American dream. Among them are Dreiser, Sinclair Lewis, Menck, Dos Passos, James T. Farrell, Nathanael West (whose *The Day of the Locust* and *Miss Lonelyhearts* have been neglected), Steinbeck, Joseph Heller (whose *Catch-22* has been greatly overrated), and Norman Mailer.

It may be, if early American writers truly caught the spirit of American society, that the fulfillment of the dream has been disappointing because we have defined it in symbols, not in acts. The slaves were freed but were prevented from exercising their rights as free people. We fought a war to make the world safe for democracy but permitted fascism to spring up in Italy and Germany. School integration laws are passed but housing and jobs are not integrated.

The subtitle of *The Urgent West* is "The American Dream and Modern Man." Mr. Allen writes that ". . . it is as though, from its beginnings, American literature has anticipated what seems to be the special nature of man in the Twentieth Century. . . . The American Dream has become the common property of the Western world."

If it is so, then America has an awesome responsibility.

In Brief

In *The Careless Atom* (Boston, Houghton Mifflin, 225 pp., \$5.95) Sheldon Novick is concerned with the potential for destruction in accidents involving nuclear reactors built for power production. He discusses the dangers of explosion and

of contamination by radioactive wastes, and also describes the elaborate techniques for monitoring the reactors and preventing accidents. The magnitude of disaster, if it comes, may account for the shrillness of tone in the book.

Mr. Novick calls attention to little known concomitant of the Government's encouragement of the nuclear power program. Insurance companies have not been willing to insure atomic power plants, except for amounts trifling in comparison with the risk. Bills passed by Congress provide that the United States will assume a half billion dollars of insurance for each reactor. A system by which the Government takes the risks and private interests take the profits holds social dangers that should certainly be considered along with the technological.

Reflections on Men and Ideas (Cambridge, M.I.T., 318 pp., \$15.00) contains essays by Giorgio de Santillano on the history of scientific ideas. To judge from this collection, his major interests are in the classical period and the Renaissance, but there are articles on Oppenheimer, Einstein, and *The Italian Novel Today*.

Professor Santillano's style combines clarity and urbanity with breadth of scholarship and acuteness of analysis. His genuine attachment to great minds and great men prompts him to defend them against petty scholars. His defense, as in the essay on Leonardo da Vinci, is sharp, devastating, and a delight to read.

He writes in three languages, and essays in French and Italian are not always translated into English. The flavor, however, is the same in any language.

New from the M.I.T. Community

The Rehabilitation Planning Game—A Study in the Diversity of Neighborhood, Langley Carleton Keyes, Jr., (M.I.T. Ph.D.'67). Cambridge and London: M.I.T. Press, \$10. Case histories of three redevelopment plans in the Boston area demonstrate how conversations and negotiations can replace the explosive "public hearing" device as a way of obtaining the interest and participation of citizens.

Appraisal Principles and Procedures, Henry A. Babcock (M.I.T.'12). Homewood, Ill.: Dow Jones-Irwin, Inc., \$9.95. Basic principles and methods of appraisal applicable to all classes of property for business, financial, insurance, governmental, and legal purposes. Two additional related volumes are planned, concerning valuation of investment and non-investment property.

Joseph Mindel is a member of the M.I.T. Lincoln Laboratory. The notes "New from the M.I.T. Community" have been prepared by the editors of Technology Review.

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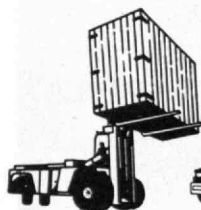
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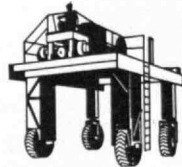
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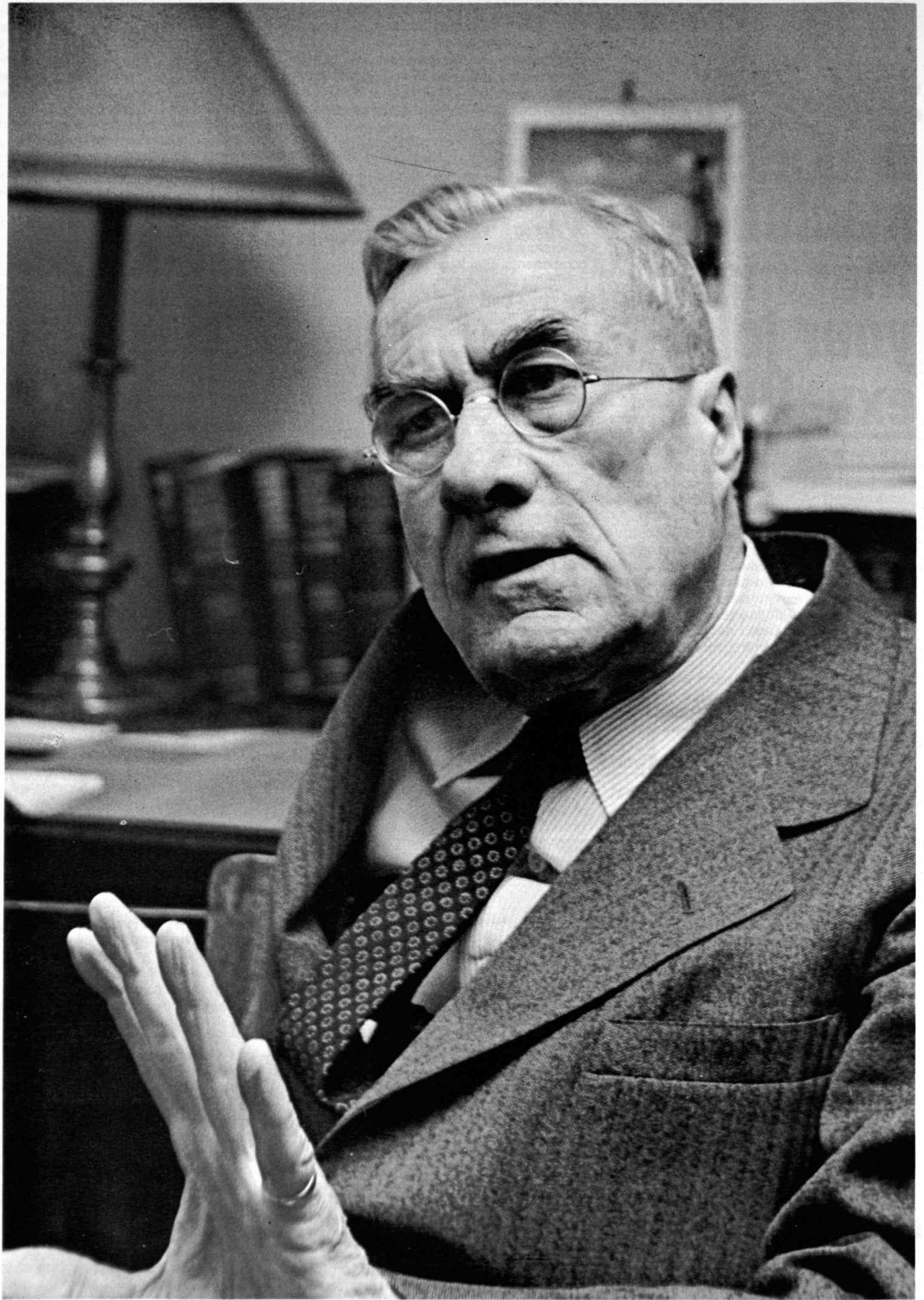
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**STUDIES IN
NEIGHBORHOOD**
Cambridge, Boston, South America



The engineer has given man his leisure and through it his spiritual as well as his material wealth. Profit is the measure of his true success

Warren K. Lewis

Emeritus Professor of Chemical Engineering, M.I.T.

The Place of Engineering in Society and Civilization

The typical engineer is proud of his profession. The importance of his work is something he takes for granted. He finds it intellectually demanding. It is intricate and involved to a point where specialization is essential. From loyalty to his task, and consciousness of work well done, he gets inner satisfaction—deep, though often unexpressed. His professional life tends to be limited to this narrow world.

For the engineer does not see himself as dealing with and endeavoring to solve problems in one of the most vital and important areas of human life and activity.

However, in its area engineering has a record of contribution to human welfare and progress second to that of no other of the great professional groups; yet engineers are unconscious of that achievement and the depth of its human significance. The engineering profession today has before it an open door of opportunity to contribute in its area a transformation in human thought and attitude that can remold civilization constructively beyond the capacity of imagination to envision.

Engineering for Leisure and Opportunity

To appreciate engineering one must know something of the history of civilization. It seems agreed that what we call by that name started when, 7000 or 8000 years ago, man first learned to grow crops in the valleys of the Nile and Mesopotamia (perhaps also the Indus). Engineering at that time involved planning and using simple types of irrigation to assure moisture during the growing season. It enabled men for the first time to build settled, stable communities on permanent locations and to produce a certain surplus of food and other material necessities of life beyond the subsistence requirements of the producing workers themselves. This was the beginning of specialization. The ruling caste assumed increased importance and grew in numbers; protection against the raids and incursions of barbarian and other neighboring communities brought into being a warrior class; the religious instinct maintained a priesthood and prob-

ably enhanced its influence. There thus developed the tradition of an upper class supported by the manual labor of a worker caste. There is a tendency to describe this state of affairs as exploitation of the poor by the rich, of the weak by the strong; but care and restraint must be exercised in this judgment, for the productivity of labor was so low and the lower classes so numerous relative to the upper that uniform distribution of the total wealth produced would have done little to ameliorate the condition of the least fortunate.

This development, which has been called the agricultural revolution, brought about a transformation in human society, the full significance of which is difficult for us to appreciate. For the first time in the life of the race a group in the community—the privileged group—possessed a certain amount of leisure time which they could use as they pleased—and with that leisure time came the wealth and the conditions which made it possible for them to use that leisure time constructively. Few of them may have used it wisely, but from the activities of those that did there was born the thing called civilization—and particularly there were born those intellectual, aesthetic, and ethical expressions of the flowering of the human spirit enshrined in the word culture. The possibility of culture was born of the agricultural revolution.

Civilizations rose and fell as centuries and millenia passed, and in all those civilizations culture was the privilege of the few based on the drudgery of the many. It could not possibly be otherwise because of the inefficiency of human labor in the production of material things. "Man doth not live by bread alone," but without bread man cannot live. For the man who has leisure someone must produce the bread. It is true that through the generations the efficiency of labor was increased; the wheel was invented, the smelting of metals was mastered, and craftsmanship was developed to extraordinary levels of skill and achievement. But the lot of manual labor, especially of the agricultural worker, remained almost unbearable. Moreover, it

was still true that the privileged were so few and for most of them their privileges so limited that equalization of wealth would not only have destroyed culture; it would have disrupted social and economic organization to such a degree that labor would almost certainly have been left worse off rather than better. Any drastic attempt to remedy the situation would have been disastrous to all.

The Fruits of Efficiency and Power

Two hundred years ago came another revolution that was destined once more to transform the production of the material things men need to live—the industrial revolution. It began with a series of mechanical inventions in the textile industry which were extraordinary exhibitions of versatile craftsmanship; but its next step—the introduction of steam power—represented the first recourse to science for the solution of an industrial problem. James Watt, trying to improve the Newcomen engine and finding himself unsuccessful and frustrated, did a new thing under the sun: he stopped working on the engine and went into the laboratory to study and measure the properties of steam. That is exactly what any top-flight modern engineer, finding himself in a similar situation, does today. When Watt had developed the reciprocating engine, he went on to invent the indicator, to enable him to follow and to measure the performance of the machine and thus to secure the information necessary for its intelligent control and improvement. By introducing the use of the knowledge and the method of science into the solution of the problems of industry, James Watt became the father of the engineering profession.

The sequel of the industrial revolution is modern western industrial civilization. The trouble is that no one appreciates its significance. Its products are thought of as roads and bridges, as tail-finned cars and jet planes, as ranch houses and skyscrapers and most particularly as gadgets, from space ships to hula hoops. The best of these are but means to an end; the worst are disintegrating in their effect on human personality. The truly im-

portant product of the industrial revolution is the increase in the efficiency of human labor; the two-fold result is, first, the increase in the material things available for living and, second, the release of time, the creation of leisure for men.

It is difficult indeed for a modern man to appreciate the condition of the working man of two centuries ago, especially the agricultural laborer. Historians tell the story of the privileged, not that of the underprivileged. A few specific illustrations may perhaps give an inkling of the change. The writer's full-time industrial job a half century (not 200 years) ago was in a plant with a work week of 78 hours. Little time did that leave for the finer things of life. A century ago only one child in 20 in this country received the equivalent of a high school education. This was not because the parents failed to appreciate the value of education. It was because the economy could not afford it; the child had to go to work. Today, the increased efficiency of human labor in the production of material goods has both released to the child the time for education and furnished the material and human facilities to enrich the opportunity beyond measure.

Consider medicine. Its achievements in mastering disease and prolonging life are a crowning glory of this last century. However, had the physician of a hundred years ago had the knowledge of today his ability to use it effectively would have been stringently limited. He could not have had the modern hospital with its expensive laboratories, equipment, and techniques. These have been made available to him by increased industrial efficiency in the production of goods. A similar story could be told concerning advances in the field of communications—better newspapers and news services, the development of radio and television and the like—and indeed in every field of human activity.

The industrial revolution has created a new civilization in which for the first time in history the privileges of leisure and the material wherewith to use it constructively are available—at least potentially—to every man, barring the one handicap of physical or mental ill health.

The credit for this achievement cannot of course be claimed for engineering alone. Our political atmosphere and particularly our economic system have played vital roles. New methods of industrial organization and management have been essential. But the primary credit for the increased efficiency of labor and hence for those benefits that flow particularly from it belongs to the engineering profession. The achievement has resulted from the use of scientific knowledge and method in the solution of industrial problems and from the introduction and

development of the techniques of mass production by the engineer.

Toward a Sense of Achievement

While the engineer has a right—indeed a duty—to be proud of his two centuries of achievement in the public interest, he has a second area of truly professional responsibility which he has persistently refused to recognize as within his province—i.e., the question of the relations of the worker in industry to his task. The engineer by his imagination and insight has discovered and invented the products of modern industry; he has developed the processes by which they are produced; he has designed and built the equipment for producing them; he has laid out and constructed the plants; he has assigned the tasks of labor and directed and supervised its operations. Nevertheless, he insists that his responsibility is limited to the technical phases of all this activity, insisting that how the industrial worker reacts to the situation is no business of the engineer. Every other great profession places top priority on what the work of the profession does to the individual personality. If the engineer continues his attitude of aloofness to the human problem he will never achieve recognition as truly professional but will degenerate instead to the status of a mere technician. Some other group will take the leadership. The tragedy of this would be the loss by the engineer of the opportunity to render a public service even greater than any he has made in the past.

The reason for this can perhaps best be explained by reference to William James' essay on the Moral Equivalent of War. James points out that, despite its brutality and horror, war does in fact bring out some of the finest qualities of the human spirit. It does this because the mass psychology of the race has through countless generations infused the consciousness of the individual with the conviction that service in war is a positive, constructive service to the whole community. This in turn gives the warrior two of the deepest satisfactions of the human spirit—the sense of contribution, achievement, accomplishment, creativity; and the exercise of loyalty to the cause, the organization and its leaders, the group and his comrades. James' plea is for the equivalent of this in constructive activity rather than in the destruction of war.

The engineer has—or should have—his own greatest reward in exactly this sort of realization that he is participating in and contributing toward the possibility of a higher and nobler civilization and culture, by providing the material things and services which form the necessary foundation for a spiritually abundant life for men. In war this deep sense of inner satisfaction and worthwhileness is shared equally by the humblest soldier in the ranks

and the general in command. The worker on the production line in industry has as much right as the engineer to this inner psychological satisfaction, because each is making his own contribution to the same underlying objective. The trouble is that nobody ever tells the worker what the purpose and objective of industry really is. Can anyone be so effective as the engineer in explaining what that purpose is?

The True Purpose of Profit

Hard jobs are what the engineer likes, but this one will really test his relish for them. The hurdle is the fetish of the profit motive. Ever since Adam Smith, everyone has said that the only effective reason for men to go into industry and business is to make a living, make money, make a profit. As a result, men have come to accept and believe that statement without question—a thing no engineer should ever do. There are indeed men dominated by the profit motive. In the small community in which the writer grew up there were two or three of them; their fellow citizens called them misers, skinflints, Scrooges.

It is not that profit should be excised from industry. The competitive profit system is probably the second most important and valuable development in the history of economics—second only to the invention of coined money. The inventor of money—whoever he was—undoubtedly recognized its potentialities and social value. He planned it that way. The profit system, like Topsy, "jest grewed." It is amazing how few people recognize, let alone appreciate, the economic purpose of profit. The function of profit is to serve as a yardstick to measure the degree of success of an individual or organization in competitive industry in the production and distribution of the material goods and services needed to meet the wants of the community.

Profit is by no means a perfect yardstick, but its advantages far transcend its limitations. The yardstick is objective. The industrial organization that cannot make a profit is a failure, although the

yardstick does not tell why it failed. The yardstick tends to put economic power into the hands of those who have already demonstrated their capacity to use it constructively in the public interest, i.e., in the efficient production and distribution of goods. Similarly, it tends to put capital into hands of demonstrated competence. It provides opportunity for the innovator to try out his ideas without upset to the whole economic life of the community, under conditions such that success will be convincing evidence of the value of the ideas. It tends to eliminate incompetent industrial leadership. It makes it possible for the community, acting through the state, to control trends of industrial development in the public interest, while retaining the advantages of the system, through wisely setting up the "rules of the game."

There is a very real sense in which the profit motive is indeed the mainspring of the economic system, but it is not the usually accepted one. In industry, wise decision as to immediate action is best assured by the will to profit. None the less, the profit motive usually is and ought to be secondary. The Olympic medal is not the primary incentive of the athlete; it is but the visible evidence of competitive achievement and success. Similarly, competitive industrial profit is the evidence of contribution and achievement in building the material foundation necessary for a richer and nobler civilization and culture.

Profit-making in industry as a hallmark of success is differentiated sharply and importantly from success in areas such as athletics. In the Olympics only one man can win; the others fail. Profit in industry requires the cooperation of everybody in the organization. The worker on the production line makes his contribution to the achievement and has his moral right to the psychological satisfactions that should accrue to him in consequence. This is indeed a moral equivalent of war, and the denial to the worker of the privilege that should be his, so often seen in industry, is an ethically intolerable thing.

There is apparently a chasm between the minds of economist and engineer. Science and engineering have based their progress and achievements primarily on the development of methods and standards of quantitative measurements. The engineer takes his measurements so for granted that he fails to appreciate their fundamental importance in his thinking. Indeed, the most important asset an engineer can possess is that capacity for sound professional judgment which inherently involves a quantitative intellectual analysis made of necessity in the face of inadequate knowledge of at least some of the significant facts. The engineer's habits of quantitative analysis mold every activity of his

mind. Quantitative dependability is always his ultimate goal. The economist, on the other hand, sometimes seems to lack the very concept of the quantitative and any appreciation of its importance and potential value of analysis.

This difference in mode of thought is perhaps the reason why the economist has never emphasized the function of profit as a measure of quality of economic service—a standard relative rather than absolute, but a standard of measurement nonetheless.

Moving Thought from the Creases of the Mind

In closing I want to recall, from a recent translation, Lavoisier's statement about his attack on the phlogiston theory which had dominated chemical thinking for a century before his own revolutionizing contributions to the science:

"I do not expect my ideas to be adopted all at once. The human mind gets creased into a way of seeing things. Those who have envisaged nature according to a certain point of view during much of their career, rise only with difficulty to new ideas."

By doing his part to move some strands of human thinking out of the creases of the human mind, the engineer can help transform the whole temper of our economic life. Everyone in industry from the chairman of the board to the janitor in the basement can find the inner satisfactions of contribution and loyalty in doing his bit to make possible a richer, nobler, and more democratic culture than the world has ever known.

One of the glories of modern science is the degree to which during the last three centuries it has pushed back the horizons of knowledge and thought. The time has come for the engineering profession to strike out into those hitherto neglected areas of industry which involve the human factors, using its competence, its integrity, and its idealism for the strengthening and defense of the material basis of our culture, not only to preserve that culture but to make possible the development of its ultimate potentialities.

Warren K. Lewis graduated from M.I.T. in chemical engineering in 1905, and has been on the faculty almost continuously since then, including nine years (1920 to 1929) as Head of the Department of Chemical Engineering. His research has earned him the title of "the father of modern chemical engineering," and his teaching has won for him the affection of thousands of M.I.T. alumni. Many of the latter were participants late this winter in ceremonies establishing the Warren K. Lewis Professorship in Chemical Engineering. This paper is based upon a recent presentation to the Louisiana Engineering Society, with whose permission it appears in Technology Review.

The Engineer in Human Destiny

On Warren K. Lewis' 86th birthday, I had the privilege of two hours with this great man under whom I had done my thesis nearly 40 years before. When I entered his office I sensed at once that the old fire, the penetrating look were still there.

"Let's go down the hall where we'll have lots of room," he said. We sat at a table three feet apart and the deluge started. At one point he asked, "So, Smith, what was the result?" and then he leaned across the table, his hand cupped to his ear, and waited for my answer. I was projected backwards to 1930, the old "shook-up" feeling returned, and I had no answer. A pound on the table and the words: "Child labor disappeared, Smith. That was the result. Child labor disappeared." Never was the past brought up so clearly to the present. This was Doc Lewis, the teacher, the intellectual taskmaster.

Those of us who were in chemical engineering recall this great teacher with deep respect. We recall his dynamism, his demand for clear analysis, his impatience with sloppy thinking. In those days he felt his place was to be more than a teacher. He was to be a director of people into a true realization of the engineer's role. Those few among the *Review's* many readers who had the privilege of his teaching will be interested to know that "Doc" Lewis has the same old fire, the same old desire. Those of you who did not have that privilege will know from the accompanying article that here is a man, internationally known for his contributions to engineering, who sees in such contributions only the most fundamental of the engineer's real achievements for man.

Doc Lewis brilliantly expressed to me on this memorable afternoon his feeling of the contribution of the engineer to the world of man. The engineer's work is far more than gadgetry. It has been far more than the building of bridges or automated production. These have been the products of his ingenuity, but the results have invaded and influenced every phase of what we call civilization. The problems now confronting us, such as stream and air pollution, the need for housing at a cost commensurate with our power to pay, the need to improve production of our medicines and the even greater need for improvement of our agriculture, will—if not wholly planned by him—be achieved by the engineer.

Doc Lewis does not say that to engineering go all the

accolades. What he does say is that engineering does not receive its full badge of honor. Doc Lewis, you see, both honors and blames the engineer. He sees engineering as a noble activity; he deplores the engineer's failure to feel his relevancy to the world about him.

And this blame he lays at the feet of both the engineer and the recipients of the products of the engineer.

Mark his words: "If the engineer continues his attitude of aloofness to the human problem he will never achieve recognition as truly professional but will degenerate to the status of a mere technician. Some other group will take the leadership. The tragedy of this would be the loss by the engineer of the opportunity to render a public service even greater than any he has made in the past."

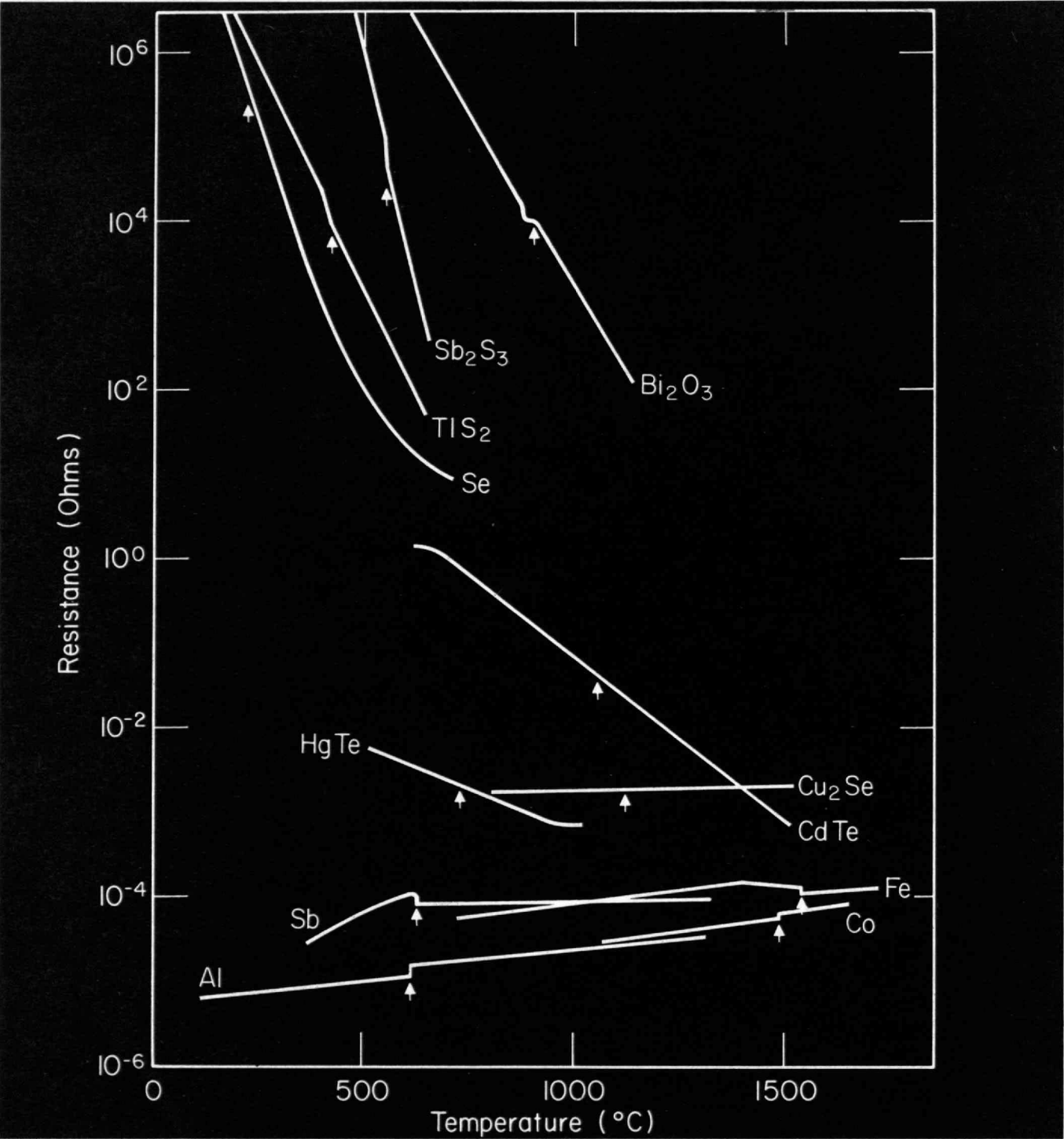
Doc Lewis does not hide his great disappointment in the students in technology today. "Look, Smith, if I stop students here and ask them 'Why do you believe in the atomic theory?' what do they say? 'Because the teacher taught me.' 'Never thought much about that question.' 'Don't really know why.' Damn it, Smith, why don't they have thoughtful answers to such questions?"

Then he answered: "It's because they don't sense their role in society. They don't see the need for reflection and hence they don't develop their loyalty to the society they have created."

Doc Lewis' words of concern are not being spoken for mere conversation. He feels a great and tragic concern for the role of the engineer. He feels that the engineer does not sit in the place of honor to which he is entitled, and, as well, that the engineer does not himself sense the role of honor he has earned. To a tragic degree the engineer is neither respected nor self-respecting enough.

Doc Lewis, after a long and sparkling career, is crying out to the technologist to assume burdens outside his daily "chores." He is crying out for society to see engineering as the well from which billions of hours have flowed to be used by the philosopher, the teacher, the doctor, the poet, the farmer, and the laborer for pursuits other than the drudgery of producing minimal creature comforts. Let society appreciate his value from the record, and let the engineer sense how much he can contribute to our destiny.

Resistance as a function of temperature for a 1 cm³ cube of several semiconductors, semimetals, and metals in both the solid and the liquid states. The melting temperature is marked with an arrow in each case. Where discontinuities occur at the melting point, they can be entirely accounted for by sharp density changes.



The realization that a practical semiconductor need not be crystalline strikes at venerable assumptions of solid-state physics and threatens yet another technological revolution

David Adler
Associate Professor of Electrical
Engineering, M.I.T.

The Amorphous Threat

In the past few months, a great deal of attention has been given to a relatively esoteric field, that of amorphous semiconductors. The stimulus for the publicity was the development of two types of switches made out of thin films of these materials by S. R. Ovshinsky, and the initial announcement was coupled with great hopes for revolutionary applications of these devices in the near future. Flat-screen television sets which can be hung on the wall, like paintings; ultra-high-frequency oscillators; desk-top computers with memories large enough to store 50 years of scientific literature—all would soon be a reality.

The devices captured the imagination of science reporters and the general public, but the reaction of established scientists and engineers was less than enthusiastic. Instead of welcoming the thought of an exciting new field opening up for research and development, the value of amorphous materials in general was questioned, the switching devices were decried, their discoverer was proclaimed a charlatan, and even the motives of the science reporters became suspect.

Worthless or revolutionary, mountebank or potential Nobel Prize winner—how will it all end? The answer may not become evident for a number of years, but certain questions can be discussed objectively at the present time on the basis of the pure research already performed on amorphous materials.

In the old days when life was simple, a solid was something which retained its shape when placed down on a table, whereas a liquid took the shape of the container. With the development of techniques like X-ray diffraction, which enabled scientists to observe the positions of the constituent atoms of a material, a more sophisticated definition of a solid evolved—a solid is a periodic array of atoms. What this means is that if one basic small group of atoms, known as a primitive cell, is picked out at random, we can discover from it the structure and environment of any other such cell in the material—the

structure is repeated indefinitely throughout the solid. This type of periodic structure is called a crystal, and solids can be easily differentiated from liquids; although, in liquids, the close environment of any atom—the nearest neighbors or next nearest neighbors—is usually the same as it is in the corresponding solid, the positions of the fiftieth nearest neighbors, for example, are completely at random with respect to the central atom.

A problem quickly arose with this definition after the discovery that several of the materials which were previously considered solids, for example, ordinary glass, did not have long-range periodicity. It was concluded that we evidently were mistaken about the nature of these materials, and they were reclassified as "supercooled liquids."

The entire theory of solids is ordinarily developed from the basic starting point of crystal periodicity, which leads directly to the classification of all solids into one of three groups—metals, insulators, and semiconductors—depending on the amount of current which flows through the material when the same voltage is applied. Given the crystal symmetry, the nature of the solid can then be predicted, and it is found that these predictions are in agreement with experiment.

It is a tacit conclusion that this agreement is a confirmation of the basic model, and that periodicity is vital to the electrical properties of solids. This is a notion, however, which can easily be tested and found wanting. All one needs to do is measure the electrical resistance of a group of materials as the temperature is varied, not only in the vicinity of room temperature but right up through the melting point into the liquid region. If periodicity is as fundamental as theory leads us to believe, qualitative changes should occur at the melting temperature, the point at which long-range order suddenly disappears.

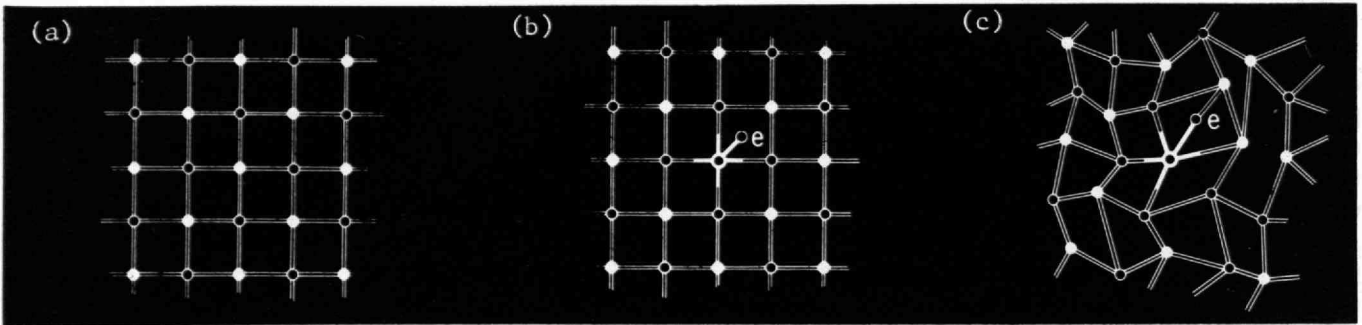
This type of experiment has been performed (see *graph*), and the results are unambiguous. With the

The lack of influence that impurities have on conductivity in amorphous (as opposed to crystalline) semiconductors:

(a) Two-dimensional representation of crystalline semiconductor, consisting of two Group-IV elements (e.g. C, Si, Ge). Every atom has four valency electrons and four nearest neighbours; thus all these electrons are used up in chemical bonding, and electrical conductivity is low.

(b) If a Group-V impurity atom is introduced (e.g. As, Sb) its extra valency electron is not needed for chemical bonding, and is relatively free to move, thus increasing the conductivity.

(c) If however the material is disorderly each atom can find a position where all its valency electrons contribute to bonding—a Group-V impurity moves to a position where it has five nearest neighbours, and its extra electron does not add to the conductivity.



exception of a handful of materials which change their short-range order (their nearest-neighbor environment) discontinuously at the melting point, almost nothing happens to the resistance of a solid as it melts. Metals remain metals, insulators remain insulators, semiconductors remain semiconductors; there may be small discontinuities in resistance, but in every case these can be attributed to the sharp density changes that occur on melting.

Obviously, periodicity is not as essential as present-day theory leads us to believe. At this point, it pays to re-examine the original motives for overestimating the importance of long-range order. The motives are clear enough—periodicity enables us to calculate. Without periodicity, solid-state theorists would be faced with a situation in which something of the order of 10^{23} electrons are moving about under the influence of a like number of positive ions arranged at random: doing the mathematics of such a situation would be a completely hopeless task. With the assumption of exactly equivalent environments for all ions and electrons, all that is necessary is to solve the problem of the small group of atoms in one primitive cell, and as long as we make sure that this solution is identical with that for every other primitive cell, we can then calculate the properties of the solid in a straightforward manner.

The strange situation with which we are faced is that the solution—that is, the mathematical theory of electrical behavior, predicting conductivities—appears to be much more general than the condi-

tions under which it is derived; it is derived for perfect crystals, and gives predictions which are still true when the crystals vanish. This need not have been so surprising. For one thing, the assumption of complete periodicity is always a lie: the universe is not one large crystal. Most crystals are rather small and have surfaces, and the surface atoms do not have the same environment as the interior atoms. Furthermore, no crystal has a perfectly periodic interior; there are always many defects in the structure.

These observations were originally dismissed by noting that the number of atoms near the surface or near defects is negligible compared with those with the "correct" environment. However, this explanation belies the original assumption, since it implies that it is the *short-range* environment which is important (for there is a large probability that any given atom has a defect within say, its fiftieth nearest neighbors). If this reasoning is carried to its extreme, it can be concluded that the major influences on any given atom are those atoms which indeed are *nearest* neighbors. And these are the *same* in the liquid or amorphous phase of a material as in the crystalline phase. With this point of view, the observed similarity in the properties of liquid, amorphous, and crystalline materials with identical short-range order is to be expected.

Thus, the only theory that is mathematically workable—that of large, completely ordered crystals—can be extended to apply to materials that are only very locally ordered; and true long-range order is

rarely found in nature anyway. Oddly enough, the materials of solid-state electronics are carefully made highly crystalline—as if this was necessary, to make our semiconductors fit our theory!

Indeed, a large proportion of scientists discount experimental work done with amorphous solids. The usual reason given is the difficulty in obtaining reproducible results with structureless material. All carefully grown crystals will have essentially the same atomic arrangement, whereas any two similarly prepared amorphous solids could be significantly different in structure.

However, this apparent weakness may well be the greatest strength of amorphous devices. It turns out that the *major* properties are, by and large, completely reproducible. In fact, due to the lack of structure, the presence of impurities in quantities which would drastically alter the characteristics of a crystalline solid has only a negligible effect on the resistance of an amorphous solid. The implications of this fact are profound, for it means that amorphous devices, as opposed to crystalline devices, need *not* be carefully prepared. This should sharply reduce the relative cost of amorphous devices, and should eventually result in a near-100 per cent yield (whereas it is not uncommon for half of a batch of crystalline semiconductors to be scrapped).

Amorphous materials have many other virtues. They are entirely resistant to radiation damage (which results in the destruction of order) and can thus be used in outer space without concern about the effects of cosmic rays or the Van Allen belt. As thin-film devices, they use a negligible amount of material and take up a minute volume. This reduces the cost of each device still further, and brings about the possibility of ultra-compact appliances.

Why then have responsible scientists and engineers been so antagonistic? A possible explanation is that amorphous materials represent a threat to the establishment. Solid-state physicists may have to give

up their basic ideas about the importance of periodicity and crystal symmetry. Crystal growers may fear that the skills they have developed will become obsolete. Theoreticians are not ecstatic over the idea of working on problems as untractable as that of 10^{23} atoms arranged at random.

But perhaps no group is so aware of the effects of a possible technological revolution as are the electrical engineers. Until 15 years ago, electrical engineering courses emphasized the importance of the different types of vacuum tubes, their current-voltage characteristics, and their use in circuits. Over a period of approximately five years, much of this information became virtually useless, and it was necessary to learn about transistors, their characteristics and limitations, and how to modify circuits to make the most efficient use of the new devices. Initially, the transistor was belittled by many, but the better mousetrap always wins out in the end. Now there appears to be a distinct possibility of a second revolution within the next few years. If so, much more would have to be learned, and a new technology devised.

The world is now benefiting from the development of the transistor in many ways. Whether or not similar rewards will come out of amorphous thin film technology only time will tell. But all the potential applications represent exciting improvements on the present devices. Whenever there is a threat, there is also an opportunity and a challenge. Scientists and engineers have reacted well to similar challenges in the past, and because of this the future continually looks bright.

David Adler joined the staff of M.I.T. in 1965, becoming an Associate Professor of Electrical Engineering this year. He is a graduate of Rensselaer Polytechnic Institute, and obtained his master's and doctoral degrees at Harvard. Between his years at Harvard and M.I.T. he worked for a time at the United Kingdom Atomic Energy Research Establishment, Harwell. His present research involves the energy-band structure of transition-metal oxides, the theory of ferromagnetism and antiferromagnetism, and conduction in low-mobility metals.



Progress on the Number One Wood

A golfer looking at the display of new golf clubs this year was faced with an unusual range of decisions. Some of these problems were old holdovers, involving such choices as swing weight, shaft flexibility, loft, lie and shape of the club, along with the perennial question of why one club felt different from another. This year, moreover, aluminum shafts became available and the uncertainties were compounded. A few of the touring professionals were using aluminum shafts, others were not. There was conflicting advice on whether to use a heavier swing weight or the same swing weight on switching to an aluminum shaft, and there were some claims about more shock absorption and less torsion with the new shafts. Anyone trying an aluminum-shafted driver noted a difference in feel, but it was not always easy to decide whether the feel was for the better.

The club and shaft manufacturers had done some substantial experimental work on the aluminum shafts. It was shown that these shafts flexed about the same as the steel shafts and did not develop a permanent set on continued use. A machine which simulated a golf swing had been constructed, and there was ample evidence that a golf ball could be hit just as far with an aluminum shaft. But a golfer is not a machine. There is an interaction between man and club which is expressed intuitively as "feeling," and the influence of this feeling could not be evaluated by a mechanical device.

In addition to the changes in shaft construction, some woods were appearing with aluminum inserts in the hitting area, instead of the usual plastic, and a special driver was being offered with a new hard bowling-ball plastic on the hitting surface. It was not clear how these changes in construction affected performance. Last year, in conjunction with a freshman seminar on high-speed photography by Professor Edgerton, we did a study, one aim being to find a way of quantitatively measuring the behavior of a club in the hands of a real golfer. There was also a considerable amount of self-interest on my part. The hope of reducing my current handicap

(13) by consistently adding some length to my drive was overwhelming.

Measurement of Performance

To start with, we found that in real life one of the main criteria of a number one wood is the initial velocity of the ball off the tee, just as it leaves the clubhead. The distance it goes depends also on other variables such as its spin, the wind, the angle its initial direction makes with the ground, and the terrain—all of which can be classed under character of swing and playing conditions. But the initial velocity depends largely on how fast the golfer is able to bring the head of a particular club through the ball and is a good quantitative measurement of the performance of a club in play.

Professor Edgerton happened to have on hand a very fast and powerful multiflash unit which had been built to measure the rapid stretching of parachute cords used on re-entry vehicles, and this unit stopped the action of a golf ball with ease. A flexible contact, placed in front of the ball, activated the flash unit just before striking. The flash unit fired 10 times, at intervals of one-thousandth of a second; individual flashes lasted for one-millionth of a second. The operation was simple, and at one point we had the members of the freshman seminar in high speed flash techniques photographing each other in a contest for the fastest ball. Their golfing performance was not distinguished.

On page 32 Professor Edgerton and assistant George Pishenin are shown at the controls and the author at the club. A typical photograph is shown on page 33 (top). The first view of the ball, from left to right, shows the ball at rest on the tee. The second shot shows the ball in flight; it was hit at some time between two flashes. The third and fourth views show the ball stopped on successive flashes, and the distance between the leading edges of these images represents the distance traveled by the ball in one-thousandth of a second. The velocities of ball, and clubhead were measured from the photographs, to an accuracy of about one foot per second.

Table 1. Swing weights and gross weights of test drivers

Club	Construction	Gross weight (ounces)
Swing weight, D-1 for all clubs marked A Official swing weight scale, 20.2 ounces		
1A	Steel shaft, plastic face	13.02
2A	Aluminum shaft, plastic face	12.64
3A	Steel shaft, steel face	12.95
4A	Aluminum shaft, steel face	12.49
Swing weight, D-3 for all clubs marked B Official swing weight scale, 20.5 ounces		
1B	Steel shaft, plastic face	13.13
2B	Aluminum shaft, plastic face	12.77
3B	Steel shaft, steel face	13.02
4B	Aluminum shaft, steel face	12.57

Table 2. Average values of initial ball velocity

Club	Construction	Swing Weight	Initial ball velocity (ft./sec.)
Author swinging			
1A	Steel shaft, plastic face	D-1	172
2A	Aluminum shaft, plastic face	D-1	178
3A	Steel shaft, steel face	D-1	178
4A	Aluminum shaft, steel face	D-1	183
4B	Aluminum shaft, steel face	D-3	180
Tex McReynolds swinging			
1B	Steel shaft, plastic face	D-3	210
2B	Aluminum shaft, plastic face	D-3	210
3B	Steel shaft, steel face	D-3	210
4B	Aluminum shaft, steel face	D-3	213
5B	Tex's own steel shaft, aluminum and plastic face	D-3	209

Four Clubs, Plus Some Lead

We evaluated four drivers, at two swing weights and with two principal swingers. The clubs were made to order by Bailey and Izett, Ardmore, Pa., with the four possible combinations of steel or aluminum shaft and steel or plastic face.

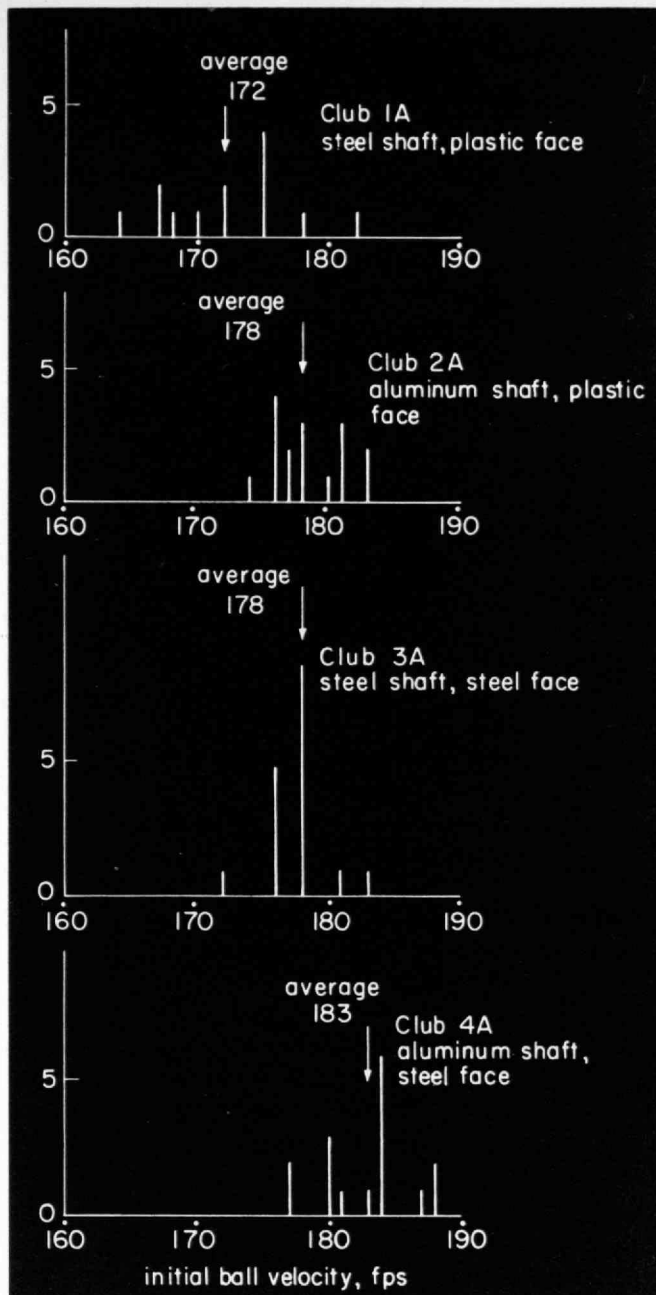
Each club was ordered with a medium stiff R shaft, and with a swing weight D-1, which corresponds to

an official swing weight of 571 grams (20.2 oz). The alternative swing weight, 580 grams, was achieved by adding lead tape.

The descriptions of the eight clubs thus formed are summarized in Table 1, which indicates some interesting features. At a given swing weight, Club 1 (steel shaft, plastic face) was the heaviest. This is my own usual driver, or it was before these experiments. Club 4 (aluminum shaft, steel insert) was the lightest. The difference, which is about 15 grams (0.5 ounces) was significant, and the clubs felt very different, even though they were at the same swing weight. If we look at the two aluminum-shafted clubs, Club 4 with a steel face was slightly lighter than Club 2 with the plastic face for the same swing weight, due to the different distribution of the weight in the head.

The experiments were run as follows. Fourteen to 17 successful shots were made with each club. A few extra exposures were required so that scuffed shots, as well as shots which were hit high on the ball, could be eliminated. We decided that these unsuccessful hits were not attributable to the construction of the club. The number of shots in each group was approximately the number of the shots with a driver in a normal round, so the distribution of velocities represents the range of drives expected in the usual course of events.

This distribution is shown in Figure 1 for the author swinging each of the drivers at a D-1 swing weight. With Club 1A, which is my usual driver, the velocities varied between 164 and 182 ft./sec. with an average at 172 ft./sec. With the aluminum shaft, Club 2A, the distribution was somewhat narrower, with an average of 178 ft./sec. However, a similar increase in performance was obtained with the steel shaft, if a steel face was used (Club 3A); the average in the latter case was also 178 ft./sec. The best performance was that of a combination of aluminum shaft and steel face (Club 4A): the slowest shot was 177 ft./sec., the fastest 188 ft./sec. and the average 183 ft./sec.

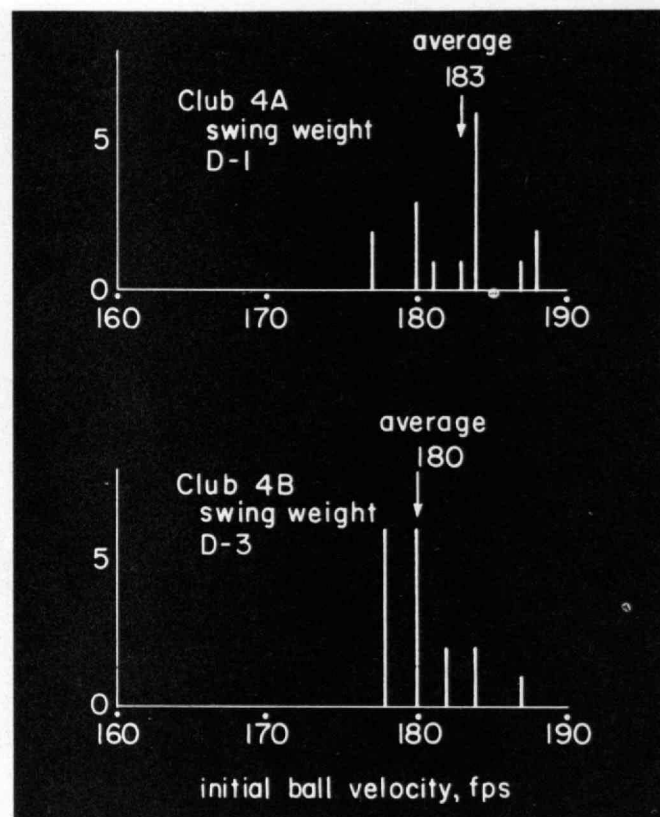


We ran a similar series at the heavier swing weight (D-3), with the club weights shown in Table 1. Figure 2 compares the D-3 distribution with the D-1 results, for the club with the aluminum shaft and the steel insert. Disappointingly, the average velocity is down, from 183 ft./sec. to 180 ft./sec. Evidently, in my hands at any rate, the heavier club was not as good as the lighter model.

Our professional at Winchester, J. L. "Tex" McReynolds, was persuaded to shoot a similar series with the same four clubs, along with his own favorite driver. All of these were made at the D-3 swing weight, which he prefers for regular use, and one of his typical shots is shown on page 33 (lower photograph). Several features are evident in a comparison of these two photographs. Tex hits them faster. His club head travels through the impact with the low point of the arc just beyond the tee.

Figure 1 (left). Distribution of initial ball velocities with the author swinging clubs with a D-1 swing weight.

Figure 2 (below). Effect of swing weight with the author swinging D-1 and D-3 swing weights. Both clubs with aluminum shafts and steel faces.

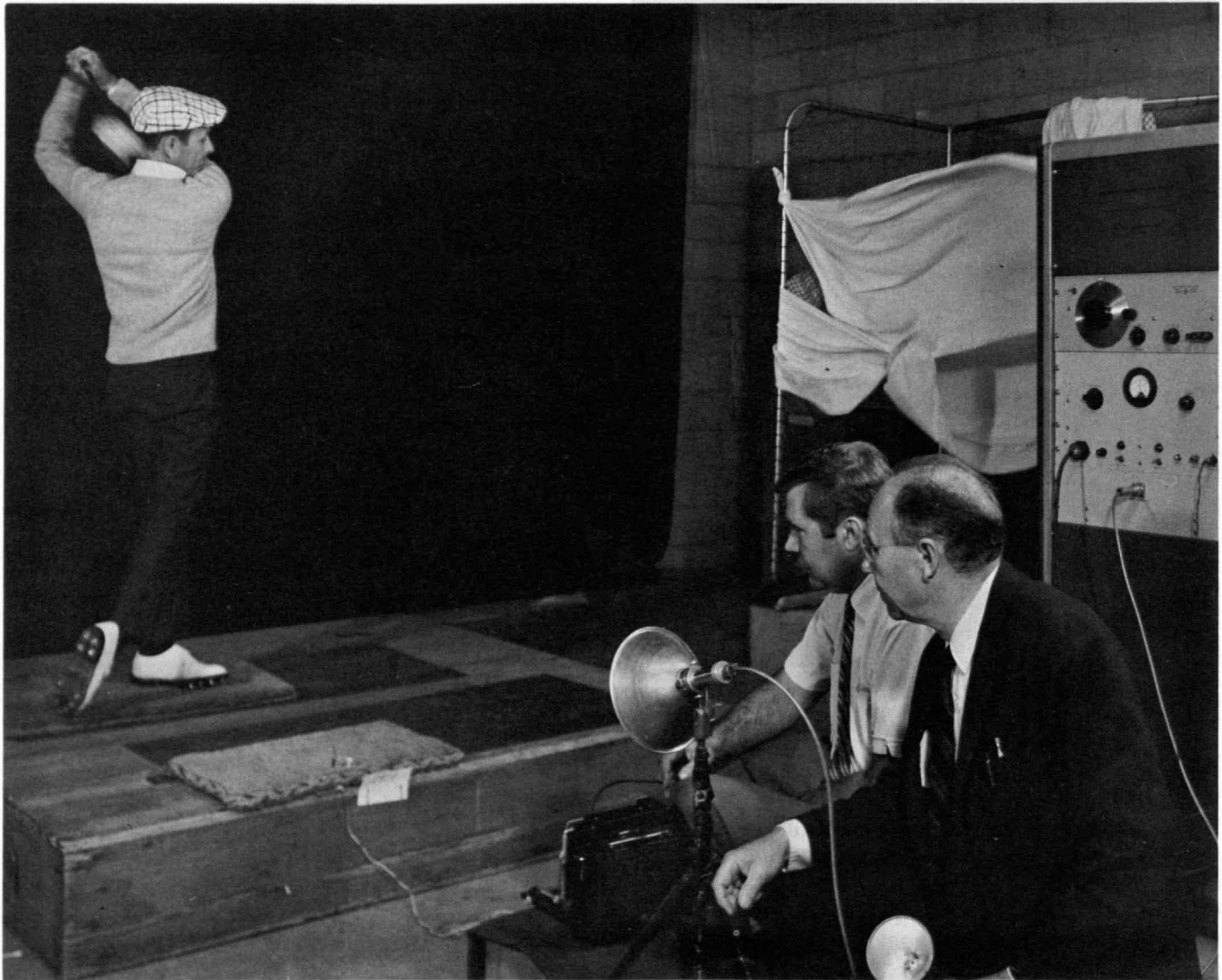
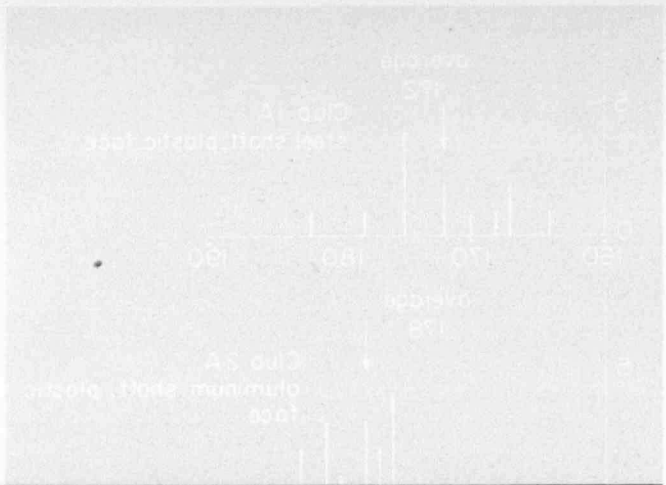


The low point in the author's arc is just before the tee, and the ball is being swept upward on contact. Tex made only about seven shots with each club, but he was so consistent that a very well defined average emerged from each series. These averages are summarized in Table 2, along with my own. Tex showed relatively smaller variations with these clubs, with most of the averages in the vicinity of 210 ft./sec. However, the best average, 213 ft./sec., was again with the aluminum shaft and the steel face, Club 4B.

Some Reasons Why

The better performance of the aluminum shaft in my own hands is probably associated with the lighter gross weight. The aluminum shaft allows more of the weight to be put into the head, even though the overall club is lighter; this new distribution was apparently helpful.

The test laboratory with Professor Harold Edgerton (dark jacket) and assistant George Pishenin at the controls, and the author at the club. The ball has been hit into the sheet in front of the net.



On the other hand, if the head gets too heavy, which is the case with the higher swing weight, some of the advantage may be lost, even though the club is still quite light. Here we are seeing the subtle interactions between man and club.

The improvement associated with the steel face involves another facet of this problem. On contact, the ball is compressed greatly. The frontispiece is a photograph taken with a very fast single flash unit,

with an exposure of one third of a millionth of a second, for a ball still in contact with the club after it has traveled about one-eighth inch off the tee. The ball has been compressed to about 83 per cent of the original diameter. The greater the compression of the ball, the more energy has been put into it, and the higher the resultant velocity.

Theory indicates that the club face is also indented by the ball. The relative indentations are greatly

A test shot with the author using the club with an aluminum shaft and a steel face. The initial velocity of the ball is 182 ft./sec. Note the flexure of the shaft.

A test shot with Tex McReynolds shooting with an aluminum shaft and steel face at 214 ft./sec.

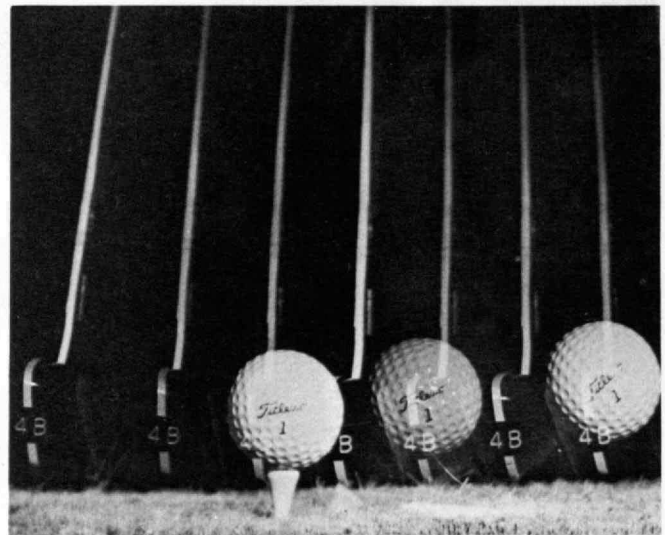
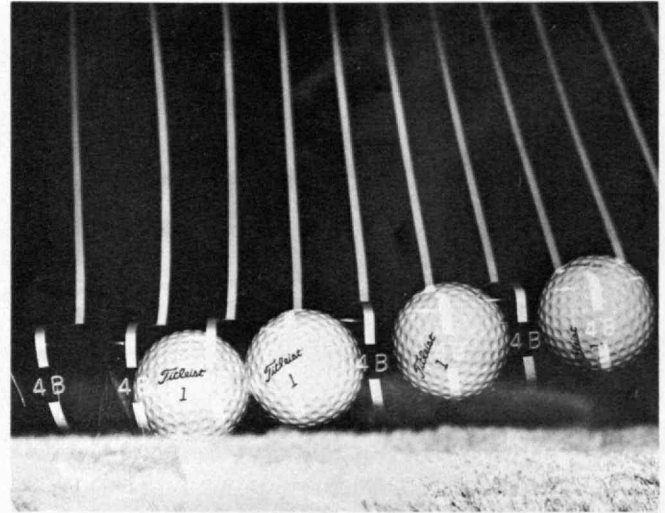
affected by the curvatures of the ball and the club face, but they are also dependent on the modulus of elasticity of each component in contact. In order to transfer the most energy to the ball, and to lose the least to the clubhead, we would like to have a face with a much higher modulus than the ball. The modulus of the ball is about 500,000 p.s.i. The modulus of the plastic insert is about the same. The modulus of the steel insert is 30,000,000 p.s.i., and so it is evident that here could be a significant advantage in using a steel face.

Our data indicate that the steel face is indeed advantageous and that the improvements with the steel face and the aluminum shaft are additive in a rough way. There is a further advantage in using a steel face because of the improved weight distribution, and the combination may be somewhat better than the sum of the two improvements.

The Practical Approach

These laboratory approaches may be interesting, but to a golfer there is only one meaningful test. I put Club 4A (aluminum shaft, steel face, swing weight D-1) into the bag for regular service during the latter part of the past summer. After two months of heavy action it would now be impossible to return to the old driver. After a short initial period of adjustment, I began to benefit from the advantages of the extra driving distance. There was an initial tendency to pull to the left, presumably because of the lighter weight, but this was corrected without much difficulty. With the old driver, a normal drive averaged about 200 yards, and a good drive about 220 yards. With 4A, a normal drive is in the vicinity of 220 yards and good ones may reach to 250 yards.

These results are encouraging and they point the way to additional improvement. Materials and design can be pushed still further, and the next development may be even better yet. Now if I could find a way to add another 20 yards——



In addition to the field of his avocation, Benjamin L. Averbach's principal research has been on non-crystalline material structure and the mechanisms of material fracture. He came to M.I.T. in 1945 following study at Rensselaer Polytechnic Institute and metallurgical work at General Electric Company and U.S. Radiator Corporation, received the Institute's Sc.D. degree in 1947, and has been a member of the faculty ever since. The article and photographs are copyright 1968 by B. L. Averbach.

During the Apollo 9 mission's fourth day, with the Lunar Module docked to the Command Module, Russell Schweickart took this photograph from the porch of the Lunar Module. David Scott is seen in the open hatch of the Command Module. The land area in the center background is the Mississippi River valley.



The transcripts of "Gumdrop," "Spider," and "Red Rover" give human dimensions to the majestic technological triumph of Apollo 9 in space

"... Running Like a Clock ..."

Less than two hours after the Apollo mission ended with a successful on-target splashdown on March 13, George E. Mueller, Associate Administrator of N.A.S.A., was calling it "as successful a flight as any of us could ever wish for . . . as successful as any we have ever seen." Later—noting that the Apollo 9 mission included tests of a new space vehicle never flown before—Robert R. Gilruth, Director of the Manned Spacecraft Center in Houston, said it was "the most complex of all the flights" to date.

Scientists and engineers—as all Americans—had a large stake in the success of these most complex projects of modern technology. The M.I.T. community has a special interest, based on the M.I.T. Instrumentation Laboratory's responsibility for the guidance and navigation systems used in all the Apollo spacecraft. And everyone at M.I.T. had a particular focus on Apollo 9 because two of its three astronauts are members of the greater M.I.T. community: Russell L. Schweickart, pilot of the Lunar Module, studied at M.I.T. for the S.B. degree in the Department of Aeronautics and Astronautics with the Class of 1956, and he later returned as a teaching assistant in 1960-61 and to receive a Master of Science degree in 1963. David R. Scott, Apollo 9 Command Module pilot, holds Master of Science and Engineer degrees (1962) from the same M.I.T. Department.

The highlights of the Apollo 9 mission occurred early in the 10-day flight—extravehicular activity (EVA) covering both Command and Lunar Modules while the two were still connected on the fourth day of the mission, and separation, independent orbital flight, and docking of the Lunar Module on the fifth day. To give its readers a feeling for the drama of these unfolding events—and for the human responses of U.S. astronauts to the demands of sophisticated technology—Technology Review publishes on these and the following pages verbatim excerpts from the radio communications between the Command and Lunar Modules and the Manned Spacecraft Center in Houston.

Extravehicular Activity

The fourth day of the Apollo 9 flight began with uncertainty about the flight plan; Commander Schweickart, barely recovering from a heavy cold when the mission began, reported nausea on the third day of the mission. Later he seemed better, and the third day's plan for testing the Lunar Module was completed—though curtailed. The schedule was also complicated by the Apollo 9 crew's housekeeping problems; reaching the Lunar Module from the Command Module took a good deal more time and effort than had been expected.

So when the mission's fourth day dawned over Houston, a sharply abbreviated flight plan was in effect. But as the day went on and Astronauts Schweickart and James McDivitt, Mission Commander, settled themselves in the Lunar Module, things began to look better. At 9:30 Houston time McDivitt reported to the Manned Spacecraft Center from the Lunar Module (code "Spider"):

Spider: Hey, I've got a recommendation to make here.

Houston: Go ahead.

Spider: Why don't we hook up the OPS to Rusty the same way we normally hook it up, take out all those things that you scratched this morning, put them back in . . . He's feeling a lot better, and he's acting like he feels a lot better. Maybe we can extend this a little bit.

Houston: Okay, that's your judgment there, and we say go ahead if you feel that way, Jim.

Spider: Okay, I'd like to configure that way and then we will see how things go.

Spider (to the Command Module—code "Gumdrop"): Configure for the normal EVA, Dave, we're going to skip all of these communication checks. Just configure for your normal one-way down relay.

Gumdrop: Okay, Smokie, this is Gumdrop. He got that.

Spider (to Schweickart in his space suit): Okay, your helmet's on and locked. Finger in the gloves. Don't need your watch, do you? Where did the checklist go? Okay, here, we don't need this thing out of here. . . Man, have I got a bunch of bags over here . . . All the snaps are off them and the locks don't lock—

In this picture, made during training for the Apollo 9 flight, Russell L. Schweickart, the Lunar Module pilot on the flight, tests the Extravehicular Mobility Unit (EMU) which he used during the flight. The unit includes suit, helmet, a portable life support system (back pack) with an oxygen purge system mounted on top, and a remote control unit on the astronaut's chest. With this equipment Schweickart was completely independent of the spacecraft, secured only by a tether line, during his extravehicular activity. (Photo: N.A.S.A.)



all I need to do is have that float out.

Gumdrop: Okay, Jim, the only thing that we didn't get that we gotta get is the EVA tether out.

Spider: This is Spider here; just so everybody is familiar with the plan, I think we'll do one daylight pass out on the porch.

Houston: Roger, copy Spider, and we agree with that wholeheartedly. Loud and clear. . . Spider and Gumdrop, you are GO for depress.

Spider: Roger. (To Schweickart): I'll tell you what we'll do. You go on outside, get accustomed to what you are doing and I'll take a couple of pictures of you. You look around and take a look at Gumdrop. When you look like you're stabilized and you think you can handle something, I'll send the camera out to you. . . Take it off on this side . . . Throw that up here . . . Okay, the camera is up there, put the handle on it . . . Let's

see, do we have the camera circuit-breaker in here? . . . I can't get that thing screwed in. Look at that . . . Gumdrop, you do have a GO for depress. I didn't hear you acknowledge it.

Gumdrop: Roger, Houston, Gumdrop copied the GO for depress.

Spider: Let me check to see if everything is glued down.

For a 40-minute interval here, Apollo 9 was out of voice communication with earth stations. When communications returned through the relay station at Carnarvon, Houston heard:

Gumdrop: Rusty, how are you feeling?

Schweickart: Good.

Spider: First thing I pass you will be a (garbled) then I will pass you a (garbled) right after that . . . You take a couple and pass it back. I'll hand you the movie camera and I'll take some more pictures of (garbled).

Gumdrop: I'm already through with the EVA sample, too.

Spider: What time did I say it was when I turned it on?

Gumdrop: Forty-seven, wasn't it?

Spider: I think so. Forty-seven.

Spider: We were on at 47—it is now 49:35. Do you want anything? . . . Not cooling yet?

Gumdrop: No, I'm waiting for the tone to go OFF . . . Okay, feed water is logged. Going to MAX cooling.

Spider: Okay, it's now showing 250 and we've turned the cooling ON. It's cool and Rusty said he feels the cooling coming.

Gumdrop: I'm all set to depress whenever you give the word.

Spider: Okay, we're all set over here, Dave.

Gumdrop: All right, did you hear? You are clear to depress.

Spider: Okay, and I just checked all the systems and everything's running like a clock . . . Okay, my antenna is released . . . The antenna is all bent out of shape, but it will—just a second.

Gumdrop: All out of shape? Do you want to come down?

Spider: No, it's all right now . . . You'd better be careful on that

door handle.

Gumdrop: Yes. I know. It's almost impossible not to wipe that off . . . The next thing I've got to do is not get this doggoned tether tangled around my wrist. Okay, I got it the right way now.

Spider: Don't get it tangled around any of your knobs either on the way out.

At this point Houston reported the mean heart rates to assembled newsmen—McDivitt, 90, Scott, 88, and Schweickart, "up close to 100."

Houston: Spider and Gumdrop this is Houston through Honey-suckle. I'm reading the Spider loud and clear.

Spider: Listen, this is Spider transmitting in the dark. If you read, fine, if you don't you don't. It's 72:57, we've had this depressurized for about 12 minutes. It looks like it's going along fine . . . Rusty's suit seems to be working all right. And Dave is in the process of depressurizing . . . Okay, all depressed and everything is looking good . . . What are you going to do when you open the door?

Gumdrop: I haven't opened the door yet.

Spider: Okay. But when you do?

Gumdrop: Okay, I'll try.

Spider: How are you feeling?

Schweickart: Good.

Gumdrop: Okay, Spider, the hatch is open, no sweat. It just swings like it ought to swing.

Spider: Very good; let's hope it swings back again, though.

Gumdrop: Well, it stayed just where I wanted it . . . I can see Rusty's foot.

Spider: Very good. Do you have a camera set up, do you?

Red Rover (code for Schweickart): Can you see me wiggling my toes?

Gumdrop: Sure can . . . If Jim looks out the top window he can see me.

Red Rover: Okay, here we go in the slippers.

Spider: Ho, there, that looks comfortable.

Red Rover: Boy, oh boy, what a view.

Spider: Isn't that spectacular?

Red Rover: It really is . . . There's the moon right over there.

Spider: Okay, Rusty, you can take a picture of Dave.

Red Rover: Okay.

Spider: Why don't you say hello to the camera or something?

Red Rover: Hello there camera. Boy, is this great.

After a 20-minute loss of contact, Houston began again to receive through the Redstone relay station:

Houston: Spider and Gumdrop: we have you through Redstone and we've been copying you loud and clear.

Gumdrop: Very good Houston. Everything's going along fine up here.

Red Rover: Okay. Do you have anything special that you want done in this pass?

Houston: No, unless you want to poke the TV camera out there.

Red Rover: I'm not sure we can get that configured out that quickly.

Houston: Roger. Understand.

Red Rover: Like us to take some more movies?

Gumdrop: I will as soon as he passes the camera out to you.

Spider: Are you ready for this camera?

Red Rover: Yeah. Okay.

Spider: Dave, you ought to get a picture of this relay here. Ah, it's too late.

Houston: Spider and Gumdrop, this is Houston. You are clear to do anything—go as far as you want.

Gumdrop: Okay, what about the time limit? How are you feeling, Rusty?

Red Rover: I'm feeling fine.

In this picture, made during training for the Apollo 11 flight, Ronald E. Evans is in the Lunar Module suit on the right, next to the Extravehicular Mobility Unit (EMU) which he used during his EVA. The suit included not only a portable life support system, but also a small, self-contained oxygen supply system. The suit was designed to be used in the lunar environment, where there is no atmosphere and temperatures can range from -150°C to 120°C.

Spider: Houston, do you want to go ahead and try the thing for two day passes and the one night pass? Looks like we might be able to do that for you.

Houston: Jim, that's your decision—it's up to you; it's all GO with us.

Spider: Okay, the thing that bothers me is if we go, we may have to reconsider how we're gonna do the rendezvous tomorrow. We're gonna have to get some sleep here sometime . . . Well, think it over and see what you decide.

Gumdrop (to Houston): I can't really tell when the jets are firing and it's sorta hard for me to tell on the quantity.

Houston: Gumdrop, this is Houston. You are using very little propellant; looks real good.

Gumdrop: Okay, Houston; thank you. Just want to make sure.

Houston: And Spider, this is Houston; we are recommending that you terminate at the end of this daylight pass.

Spider: Okay, I sorta felt that way, too . . . Okay, Davey, come on out.

Red Rover: Okay. I'm gonna let the camera run here.

Spider: Dave, come on out, wherever you are.

Red Rover: Stand by; let me get away, my little push button. Now we're all taking pictures of everybody taking pictures.

Spider: Yeah. You want to retrieve a sample?

Red Rover: Roger. That's a good idea.

Houston: And Gumdrop, you'll be getting a warning on your H₂ tank—

Red Rover: Why don't you lean over here again; I'd sure like to get a picture of that whole scene.

Houston: Gumdrop, you'll be getting a warning in about four minutes on your H₂ tank. No sweat.

Gumdrop: About those window marks over there.

Spider: Yeah.

Houston: Gumdrop, this is Houston. You may obtain a warning on your H₂ tank; no problem.

Spider: Hey, you ready for your thermal samples?

Red Rover: Okay. You ready? Ready.

Spider: Samples here?

Red Rover: Ready.

Spider: Okay, Dave, let me get around here where I can get a picture, too.

Houston: Gumdrop, Houston.

Spider: All these marks all over these windows . . .

Houston: Gumdrop, Houston.

Spider: Hey, use your head when you're out there; you know this isn't a contest between you and that sample.

Red Rover: Roger.

Houston: Gumdrop, Houston. Anticipate a warning very soon on your H₂ tank.

Red Rover: Okay, and you want to hook it in the solid ring, David, rather than that wire.

Gumdrop: Okay.

Red Rover: That's the thermal set.

Spider: Yeah, you're getting it wrapped up around your neck.

Houston: Gumdrop, do you read Houston?

Red Rover: Oh, there's Baja, California. Oh, very pretty. Wonder if I've got any film left; oh yeah, got more film here.

Spider: One place that's not too hard to recognize.

Red Rover: Yeah . . . It's set right, isn't it? F/11?

Spider: F/11; it's not set at infinity.

Red Rover: Oh no, he's got it on a 60th, though.

Spider: I wonder if I ought to keep it there.

Red Rover: I don't know. The other ones were taken at 250; it depends on what got knocked over . . . when it was going out.

Spider: Why not leave it there?

Red Rover: This is the camera we used this morning when I took pictures inside the tunnel with the wide angle lens on it at a 60th, Jim . . . Did you know there is a washer between the two panes of our overhead window?

Houston: Gumdrop, this is Houston, do you read?

Gumdrop: Houston, go ahead.

Houston: Pass the word to Gumdrop that if he just got a master alarm, it's the H₂ tank; no problem.

Gumdrop: The lights are off. This was not scheduled.

Spider: It's 24 minutes through the run; we've got about another 15 minutes and we should start thinking about getting back in . . . Hey, David, things are still falling out up there;

what are you doing, throwing everything overboard? . . . Rusty, why don't you pass the camera back in here and work on the rails for just a minute?

Red Rover: Can you stand by one minute? . . . Gotta change film packs here.

Spider: Okay, here comes another one. . . Just a minute, let me get this other one zipped in . . . Take it easy out there; don't want you getting . . .

Red Rover: Oh, I'm not gonna throw you anything; I'm gonna pass this camera back in. Take your time . . . Ooh, the sun is really bright . . . Houston, this is Red Rover; if you read me I'm just gonna follow up the line here. The suit is very comfortable—I'm on minimum cooling and I haven't had any problem at all—the only thing that is warm at all are my hands and they are just very warm, they are not very hot at all . . . Hang it on that tether. It's a good way of getting things in and out, but they are sort of out of control.

Spider: Why? Won't they get inside?

Red Rover: It's just getting it through the last part of the door there. It ricocheted off everything on the door . . .

Spider: You can have two more minutes out there, and then you ought to start coming back in.

Red Rover: Okay.

Spider: I want us to be in while it's still light outside.

Gumdrop: I tell you, the toughest part of the whole thing is trying to change the film magazine.

Spider: Yes, I figured it would be, Dave.

Gumdrop: It's a mundane task.

Spider: Matter of fact, Rusty, why don't you get out there and move around a little bit and—there goes the camera, Dave.

Gumdrop: No, it's tethered. I learned that from a friend of mine named Mike.

Spider: Rusty, why don't you exercise the handrails just a little bit just to see how they work and don't go very far up and if Dave gets the picture, fine, and if he doesn't, well that's just too bad.

Red Rover: Okay.

Spider: Why don't you come over and get the thermal sample and get it in so we won't have to mess around with it.

Gumdrop: Good idea, coming up. Hey, let me have my hose back.

Red Rover: Oh, shoot.

Gumdrop: Wait a second.

Spider: This poor movie camera. If it ever runs again, it will be a miracle.

Red Rover: Was it kind of warm when it came in?

Spider: No, it just got bashed around. The hook doesn't hook onto it right, it slides up and down the wire and it's got that stretch cable on it, so every time the tension comes out, the stretch cable slams it into something.

Gumdrop: Okay, go ahead, pull it. Hook it on down there and lock it. Dave, have you taken any pictures yet?

Gumdrop: No, I can't get it to run now, would you believe.

Red Rover: Okay, the heck with it, then.

Spider: His camera got smashed around a little bit, too. I think these cameras are good for one strobe pack and that's about it when you are doing work like this with them.

Houston: Red Rover, Houston. Do you read?

Red Rover: Let me turn around here and get some stills.

Gumdrop: Okay, stand by just one minute here.

Houston: Gumdrop, Houston. Do you read? Hey, anybody up there read me? This is Houston.

Red Rover: Oops, there goes a nut.

Gumdrop: Okay. What, are you talking about me again? . . . One each thermal sample coming in.

Houston: Spider, Houston. Do you read?

Red Rover: Okay. Can you take them up there and let me get that hook back?

Spider: Yes, if you—just hang on a second.

Red Rover: Okay. I tell you what. I don't need the hook just to go part of the way up and back down again.

Spider: Oh goodness. Get down in there, food . . . Rusty, I want you to evaluate those handles and when you get through with that, I want a conclusion from you on whether it's a practical way of doing it, like we've already said it is.

Red Rover: Okay.

Spider: Stay away from the radar antenna.

Red Rover: Roger. Oh yeah, this is very good.

Spider: Hey, let me get that camera out . . . Smile.

Red Rover: Hello, there. This is no problem at all.

Spider: Okay, go on back down it again. Hey, Dave, did you get your movie camera running yet?

Gumdrop: No, but I'd like to try, if you'll give me a minute.

Spider: Well, you've got four minutes. When the four minutes are over, we are going to have to come back in, with or without the movies. If we get them, fine.

Red Rover: Yes, there are almost no disturbing torques, I mean I don't have any problem at all just maintaining myself wherever I want.

Spider: Come around the window here. Can you?

Red Rover: I'll just push out a little bit. Wait, let me come up this way. How's that? I'm in the shade though.

Spider: That's okay . . . The trouble is I've got this latch—I'll try to take pictures around that. I'm not sure I'm succeeding. Okay, Dave, you ought to take some pictures. I can turn around and—Rusty, why don't you go up and down the thing. Go back down to the shoes and get back out there again.

Red Rover: That's a very pretty scene.

Houston: Spider, this is Houston, or Gumdrop, or Red Rover. Do you read? Hello, Gumdrop, this is Houston. How do you read?

Spider: Okay, Dave, do you have it running yet?

Gumdrop: Just about.

Spider: Is it working?

Gumdrop: I can't tell. Just a minute.

Spider: I could feel it when mine was going . . . I'm afraid, amigo, the camera has failed . . . Rusty, why don't you start coming in?

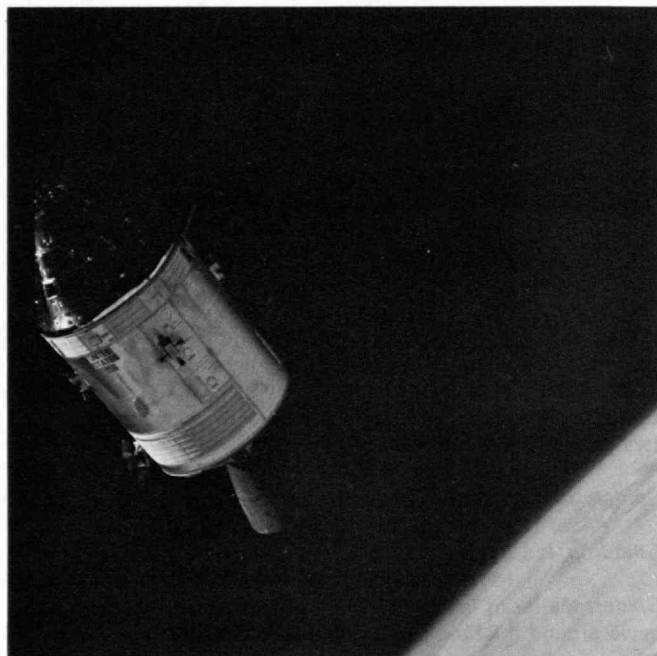
Red Rover: Right, coming in. Jim, do you want to pull in the tether a little?

Spider: I'd sure like to.

Red Rover: I believe the door finally got itself closed and stuck. It's open now again.

Spider: Okay, now, I'll get it all the way in. I'll do my best to stay out of your way. The only trouble is my hoses are kind of out where you are liable to hit them . . . It's going to take me awhile to get down there and get that thing closed. I just wanted to make sure you got back inside . . . I'm having trouble with the hatch . . . There we are . . . Let me get across the top here; maybe I can get out of your way.

Red Rover: That isn't going to work.



Spider: Let me get back in the corner . . . The best that you can do, if you can, is to gather this goop up here, sort of keep it up off the floor . . . Dave, you ought to start getting your hatch closed, if you aren't already doing it.

Gumdrop: Okay.

Houston: Spider, this is Houston. Sounds like you have your hatch closed.

Spider: Not quite; it closed, but it's not locked.

Gumdrop: Gumdrop's hatch is closed and locked.

Houston: Roger, understand hatch closed and locked. Good show . . . Sounded like Red Rover had quite a time.

Spider: Well, I hate to do it, but I've got to get my head in front of your legs, instead of behind them.

Red Rover: There, that's good.

Spider: It's closed, and locked.

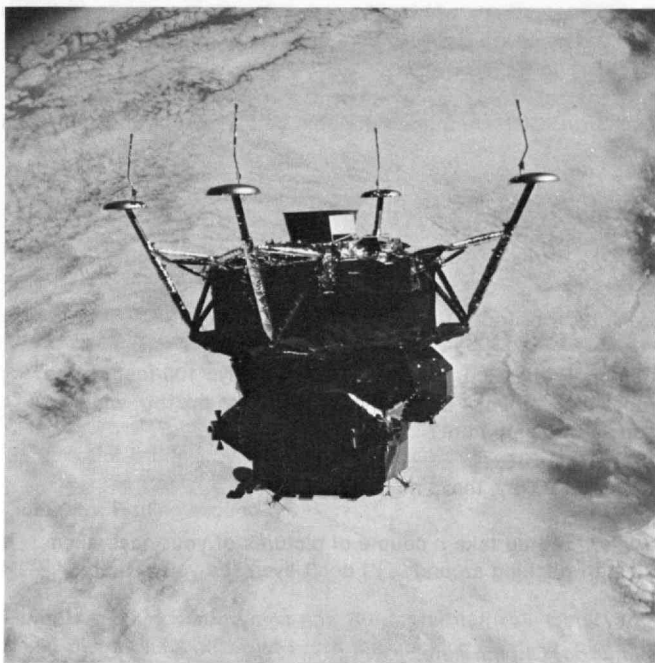
Undock and Rendezvous

After a short night's rest, the Apollo 9 astronauts proceeded into the second dramatic phase of their flight plan—the separation, maneuvering, and dock-

"That's a nice looking machine," said Astronaut David R. Scott, riding the Apollo 9 Command Module while he watched the Lunar Module recede after a slightly irregular undocking (below).

"So is yours," said Astronaut Russell L. Schweickart, looking back at the Command Module (left).

It was the first time that the Lunar Module had been flown in manned independent flight, and Scott is the only man who has thus far seen it fully configured and flying in space. (Photos: David R. Scott and Russell L. Schweickart from N.A.S.A.)



ing of the Lunar Module. Radio monitoring was possible during only portions of this activity, but many of the transcriptions are revealing.

The series begins over the Bahamas, with McDivitt and Schweickart in the Lunar Module ("Spider") and Scott in the Command Module ("Gumdrop"):

Houston: Very good, you're loud and clear. Standing by for your undock.

Spider: Roger, we're ready.

Gumdrop: Ready . . . 3, 2, 1, undock.

Spider: UHOH. We didn't release.

Gumdrop: Hang on a second, I'm going to pull back a little . . . Okay, we're nice and stable with respect to you. Okay, we seem to be hanging; the capture latches haven't released.

Spider: Yeah, that's what it looks like . . . We're pretty stable here; wonder what's wrong with it.

Gumdrop: Houston, got any suggestions? . . . Okay, you're free.

Spider: I'm free?

Gumdrop: Roger.

Spider: What did you do?

Gumdrop: Oh, went back to the old memory and put a cycle on the switch and you look like you're free.

Spider: Okay, great . . . Our attitudes are a little screwed up now, Dave, so we may have a little problem with that . . . How am I drifting away from you?

Gumdrop: Elliptic out of plane. To your rear.

Spider: Okay, well, I can't notice that. My range looks good except my yaw is going about one degree per second . . . When I get over here Dave, why don't I just stop the yaw and roll my roll so that I'm rightside up, then it'll get back to maybe about the right attitude—at least in plane.

Gumdrop: Good idea.

Spider: I'm gonna come right side up here now and when I get there I'll just stop and you can position yourself.

Gumdrop: Okay.

Spider: I think it would be all right if we just get some relative attitudes because I'm going to maneuver to the proper attitude for the separation, and you can line up with me there.

Gumdrop: Okay, I'm going to start now.

Spider: You're clear.

Spider: Looking good.

Gumdrop: That's a nice looking machine.

Spider: So is yours.

Nearly six hours later, after Astronauts Schweickart and McDivitt aboard the Lunar Module had completed a number of maneuvers which put the Module into and out of various orbits monitored by Scott in the Command Module and by the Manned Spacecraft Center at Houston, the following was recorded through the Huntsville relay station as the Lunar Module made its rendezvous approach to the Command Module:

Gumdrop: What kind of range rate do you have?



After a day of undocking, maneuvering, and docking the Lunar Module in space, Russell L. Schweickart in "Spider" told Astronaut David R. Scott in "Gumdrop" that "when I take a break I'm going to bed for three days." It was more than five days later before the tired Apollo 9 crew returned to earth in a perfect re-entry (left) and stretched their legs (left to right—Schweickart, Scott, and McDivitt) on the deck of the U.S.S. Guadalcanal. (Photo: N.A.S.A.)

Spider: I now have 42 feet per second.

Gumdrop: All right, I've got 3.0 miles at 43 feet per second . . . What's your pitch angle?

Spider: It's about 86 degrees—something like that.

Gumdrop: Oh, I see you out there coming in the sunlight.

Spider: Great.

Gumdrop: You're the biggest friendliest funniest looking spider I've ever seen.

Spider: Dave, did you ever really want to get some pictures of the ascent engine area? . . . I think what we'll do is I'll come on up and stop out front there. Pitch over so you can look at our ascent engine.

Gumdrop: Okay. I agree. We ought to get on with it . . . What kind of range do you have now?

Spider: I have 9,800 feet and our range rate is 32½ feet per second.

Gumdrop: Roger. I have just about 9,000 feet and 33.

Three minutes later, relayed from Hawaii:

Gumdrop: I'm at 550 feet, 10 feet per second.

Spider: Okay, sounds pretty good.

Gumdrop: Your fronts are just little yellow dots.

Spider: Okay, we're five feet per second, about 610 feet.

Gumdrop: But you are upside down, again.

Spider: Yes, I was just thinking, one of us isn't right side up.

Gumdrop: Boy, you've got contraptions hanging out all over.

Spider: Okay, I have us about 340 feet.

Gumdrop: Okay, looks closer than that.

Spider: Doesn't it, though?

Spider: Okay, got your camera out so you can take a picture of my bottom half?

Gumdrop: Roger, why don't you come all the way in and stop and then pitch over?

Spider: Yes, that's what we're doing. We'll come on in and stop and then you are going to take over station keeping and I'll pitch around.

Gumdrop: Give me a mark the next time you turn your thrusters on.

Spider: Okay, 3, 2, 1 MARK.

Gumdrop: Thank you.

Houston: How does that sports car handle, Jim?

Spider: Pretty nice . . . Okay, Davey, it says 100 feet on the radar tape. It looks a little closer to that to me, but what do you say we stop here?

Gumdrop: Okay, that's a good idea.

Spider: Let me take a couple of pictures of your nose, then I'll start pitching around . . . I don't even see you in there, David.

Gumdrop: Oh, I'm here.

Spider: Okay, Dave, we're going to start up on auto maneuver here, and we're going to pitch up and then you can take a picture of our bottom.

Gumdrop: Looks like a big black hole where an engine used to fire . . . I've got a couple, why don't you just keep going the way you're going? . . . I can see the injector, as a matter of fact. I can even see the chamber right now.

Spider: Okay, fine. Let's take another picture and we're going to maneuver back around.

Gumdrop: Okay, I guess the next order of business is to get set up.

Spider: Roger, get set up and let's get on with the docking. . . . Why don't you do your roll? When you do that then I'm—how's the sun? Would you be able to dock on top of me if I can't see you?

Gumdrop: I'm in good shape sun-wise.

Spider: Okay, fine.

Gumdrop: Okay, Spider, I'll do station-keeping when you turn around.

Spider: Why don't you do your roll first, Dave?



Gumdrop: Fine, here we go.

Spider: Got window over on the other side.

Gumdrop: Rolling around 60.

Spider: Roger.

Gumdrop: Okay, I'm holding now 60 degree left roll. Could you stand by one second while I turn the docking light on, please?

Spider: Okay, I've got it, Dave, very faintly.

Gumdrop: Okay, now all set, tighten the band and the whole works.

Spider: Okay, Dave, now you station-keep and I'm going to pitch over.

Gumdrop: You've got to come back quite a ways, to your rear. Easy does it. Whoops, too far.

Spider: Yeh, I know.

Gumdrop: It looks like a sporty little machine.

Spider: I just can't see through the COAS (*optical alignment sight—Ed.*), Dave. I don't know exactly where you are with the . . .

Gumdrop: Okay, do you want me to do it?

Spider: No, let me work my way in here a little closer . . . Dave, I just can't see it. Let me get in a little closer.

Gumdrop: You're coming fine. Just coming easy like that, looks like you are coming from an angle, but you are coming in with the right attitude. You ought to go forward and to your right a little bit, relative to your body . . . You're fine.

Spider: It doesn't look it to me.

Gumdrop: You are going to come in from an angle fine. Your yaw is off about 2 degrees.

Spider: I just can't see the darn COAS. See what my attitude is . . . I'm lined up in translation, but I can't tell what my attitude is, Dave. Oh, I see it, there it is, there.

Gumdrop: Now you're coming in. That's looking better. There you go. I think you've got a handle on it now.

Spider: It keeps disappearing.

Gumdrop: Okay, now you're looking pretty good . . . You're inside the capture mounting now. You're okay. Looking good.

Spider: Okay, I can see it now . . . That's really sporty.

Gumdrop: Sure is, I can tell. You are looking good . . . Keep coming. Almost there. Okay, you are about there. . . I have capture.

Spider: Whew. I haven't heard a song like that in a long time.

Gumdrop: That was a very nice docking.

Spider: Dave, that wasn't a docking, that was an eye test. Okay, Houston. We're locked up.

Houston: That sounded real beautiful. Good show.

Gumdrop: Okay, Spider. I'm in free and you're in free and at that you may proceed into the tunnel here when I get squared away.

Spider: Okay, Dave. We will start getting ready.

Gumdrop: Okay. Why don't you take a break for a while?

Spider: No, we've still got a lot to do . . . Man, when I take a break I'm going to bed for three days.



Can we as a society restore our enthusiasm for technology? Part of the answer is a new system for its democratic control, including "advocates" and "judges"

Arthur Kantrowitz, Director
Avco Everett Research Laboratory
Everett, Massachusetts

The Test

An outstanding characteristic of our time is the appearance of widespread *fear* of new technology. The fear of nuclear weapons is so deep that most people now regard discussion of nuclear weaponry as obscene. The fear that a computerized society will destroy human values is more widespread than it is articulate. Possibilities just beyond the present capabilities of science, such as genetic surgery, offer opportunities and consequences difficult to imagine. Of all the frightening aspects of technology the most frightening is its unpredictability. Adlai Stevenson once illustrated this unpredictability beautifully in a talk given in 1964. He said, "And I find myself on a par with the greatest scientific minds of the time (1937)—for I, too, failed to foresee nuclear energy, antibiotics, radar, the electronic computer, and rocketry."

In addition to these well-founded and deeply felt fears of the primary effects of technology, there has been in recent years an enormous emphasis on the undesirable secondary (i.e. unintended) effects of technology. For example, there has been a tremendous emphasis on the pollution of our environment. When someone mentions a power plant, many people think of it first as a device for producing pollution, and only secondarily of its role in producing electricity.

Dealing with these secondary effects will typically require some extensions of technology—e.g. environmental technology—and some social and political advances, for example, the creation of incentives or regulations sufficient to prevent pollution of our environment. I think we can gain some perspective on these secondary problems by recalling problems of this class which were considered important some years ago. For example, the exhaustion of our fossil fuel supplies. It was fashionable to calculate in the twenties and thirties that we were very soon going to run out of the energy necessary to drive an industrialized society. This problem has been solved in our time long before it became oppressive. Any difficulty which can obviously be dealt with by more technology should

concern us much less in view of our enormous capability for the creation of new technology to meet recognized problems. These are to be distinguished sharply from the primary effects discussed earlier which cannot obviously be helped by more technology.

Nevertheless, these secondary phenomena have frequently served as obvious targets for criticism of the "technological society." We have seen in recent times increasingly vicious attacks directed at these targets. For example, Wilbur Ferry says (*Saturday Review*, March 2, 1968), "The writing [of rules and regulations governing technology] must be done by statesmen and philosophers consciously intent on the general welfare, with the engineers and researchers summoned from their caves to help in the doing when they are needed." Norman Mailer, at a recent symposium, said (*New York Times*, May 26, 1968), "I think American society has become progressively insane because it has become progressively a technological society. A technological society assumes that if it has a logical solution to a problem then that is the entire solution.

"If it decides that the problem, for instance, is to keep food in such a way that it may be eaten six months later, then it proceeds to freeze it, and then it points out to you that six months later when you unfreeze that food you can still eat it. What it does not decide scientifically—although it pretends that this has been a scientific operation—is what portion of that food has been destroyed, what unknown ailments may possibly be inflicted upon the generations of the future." To quote one more assessment of the current scene, Paul Goodman has written (*Utopian Essays and Practical Proposals*), "And inevitably, given the actual disasters that scientific technology has produced, superstitious respect for the wizards has become tinged with a lust to tear them limb from limb. Calling this anti-scientific bent Luddite, machine-breaking, is to miss the public tone, which is rather a murderousness toward the scientists as persons, more like anti-Semitism."

The revolution brought about by the magnificent union of science and technology is now threatened by a massive counterattack driven, I believe, by the very real and justified fears of the consequences of technology but perhaps still more by the unpredictability and the present lack of control of technology.

There can be little doubt that this counterattack has already noticeably decreased the capabilities and the funding of research and development in the United States. This type of counterattack has been powerful for several decades in some of the countries of Western Europe, and it is my opinion that it is to a considerable extent responsible for the "technological gap" which reportedly exists between Western Europe and the United States. On the other hand, enthusiasm for technological progress is deeply implanted in the Soviet Union, and continues to flourish there. I am convinced that only a few years of continuation of our present vigorous counterattack on technology will result in a technological gap between the United States and the Soviet Union which will be reflected in our economic and our strategic posture with catastrophic consequences.

We have come now to a critical point in the development of science-based technology where it has become so powerful as to inspire widespread fear and to provoke widespread reactions. The real question before us now is will we, and can we, take action to meet the very real problems that are raised by this enormous power or will we attempt to escape? Continuation of the vigorous growth of science-based technology requires rekindling of the enthusiasm for its promise which was the main drive, for example, in America before World War II.

This is the test. Will we meet the challenge or will we escape it and slow the progress of our technology?

This test of societies is analogous to many of the tests that individuals face in growing up. Danger-

ous times occur when children are first entrusted with dangerous devices. The responsibilities that go with increased power are essential parts of the growth process. In some cases these responsibilities are avoided, and the individual escapes the inevitable growing pains. In other cases, the challenge is met and the individual continues to grow. I believe that technological progress has been one of the prime movers in the growth in our society through the centuries. We must not allow those who would escape this challenge to dominate the thinking of young people.

I lack the wisdom to set forth a prescription for meeting this challenge in any generality. However, I am convinced that one of our pressing needs is to achieve a mechanism for the democratic control of a rapidly advancing technology. Note that this doctrine is in direct opposition to the doctrine of the "moral responsibility of scientists," a modern form of "noblesse oblige." (I am not suggesting that individual scientists should be absolved from moral responsibility for their actions; but the scientific community should not aspire to a role as the conscience of our society.) It certainly is not in the tradition of this country to endow an elite with overriding authority and to entrust our future to its sense of moral responsibility. I am convinced, therefore, that in meeting the current challenge we must achieve a mechanism for democratic control of sophisticated technology, in spite of the fact that our elected representatives do not and cannot be expected to have the deep scientific knowledge needed to provide an adequate base for the decisions they must make. Thus communication between the scientific community and the political community is vital to democratic control.

The Decision Making Process

The governments of all advanced countries have had to make decisions on questions which have an important scientific component—that is, questions involving areas of science so new that no unanimity has been achieved in the scientific community, and so important that the decisions inevitably have im-

portant political and perhaps moral implications. I shall refer to these as mixed decisions. Historical examples of mixed decisions are: the World War II decision to build an atom bomb; the German decision (a blunder I think) to build ballistic missiles during World War II; the U.S. decision not to use our ballistic missile capabilities to launch a satellite until after the Russians had beat us to it; the current decision to direct our primary space effort toward beating the Russians to the moon.

These decisions all involved technologies new enough so that debatable extrapolation of hard scientific fact was required. All of these decisions were of great political and sometimes moral importance. We now face a variety of mixed decisions, for example, those involved in dealing with the secondary effects discussed earlier, and still more importantly those involved in dealing with the real fears engendered by the great powers of new technology. These decisions must be made before unanimity exists in the scientific community. The problem of communicating with a divided scientific community is and will remain one of the most difficult aspects of making mixed decisions.

The essential input from the scientific community to decision making in the United States is via the scientific advisory committee. Without going into detail about this process, I would like to make several points. First, in seeking scientific advice on questions of great social importance we must recognize that the moral responsibility which many scientists feel very deeply can easily affect their judgment as to the state of scientific fact when the scientific facts are not yet crystal clear. Second, the selection of scientific committees has always been beset by the dilemma that one must choose between those who have gone deeply into the subjects under discussion and accordingly will have preconceived ideas about what the outcome should be, and those who are perhaps unprejudiced but relatively uninformed on the subjects under discussion.

As Warren Weaver has put it (*Science*, Vol. 130, No-

vember 20, 1959), "A common procedure is to set up a Special Committee of experts on X in order to find out whether X is a good idea. This committee is, characteristically, national or even international in scope, is formed of external experts of recognized standing (external as regards the agency in question but most emphatically internal as regards X), and always contains a comforting proportion of what might be called right names. These are men intensively interested in X, often with lifelong dedication to X, and sometimes with a recognizably fanatic concentration of interest on X. Quite clearly, they are just the lads to ask if you want to know whether X is a good idea."

Finally, scientific advisory committees have, in many cases, played an influential role in decision making without taking public responsibility for their judgments. In the making of mixed decisions the validity of the scientific input has frequently been brought under question.

Three Proposals for Science Advice

I have three recommendations directed toward institutionalizing the scientific advisory function with a view toward increasing the presumptive validity of the scientific input.

1. Separate the scientific from the political and moral components of a mixed decision.

It has occasionally been maintained that scientific and non-scientific components of a mixed decision are generally inseparable. It is, of course, true that a final political decision cannot be separated from scientific information on which it must be based. The reverse is not true—a scientific question which logically can be phrased as anticipating the results of an experiment can always be separated from any political considerations. (It is true that there are important questions which are best answered by scientists which are not scientific questions according to this definition. An example of this sort of question is the relative competence of scientific groups, which might be important in a decision as to

where to locate a major scientific facility. In many cases, however, the essential information which the political community requires from the scientific community is a considered and unbiased statement of the currently available scientific facts. It is to such cases that these suggestions are addressed.)

Thus, the question—should we build a hydrogen bomb?—is not a purely scientific question. A related scientific question—can we build a hydrogen bomb?—could in principle be answered by an experiment.

It is almost inevitable that scientists who have been engaged in research relevant to the scientific side of great mixed decisions should have deeply held political and moral positions on the relationship of their work to society.

Scientific objectivity is very difficult to achieve and is a precious component of wise mixed decisions. I do not believe it is possible for scientists to have deeply held moral and political views about a question and simultaneously maintain complete objectivity concerning its scientific components. In the past, scientific advisory committees have frequently developed close relationships with the officials who have final decisions to make. They have frequently advised political figures about what final decisions to make. They have frequently advised political figures about what final decisions they should reach, not only about the scientific components of a decision, but about the moral and political implications as well. The close relationship may be valuable; however, it does point up a need for an alternative source of scientific judgment which shall forego taking any moral or political stands and seek to achieve the greatest possible objectivity.

2. Separate the judge from the advocate.

To my mind there is no other solution of the problem discussed earlier—of combining the highest level of expertise with lack of prejudice—except the solution arrived at centuries ago in the similar legal problem. If one insists only on expertise in advocates, and expects them to marshal the arguments for one side of a question, one can call on the services of people who have gone most deeply into a particular subject and who have in the course of this work arrived at a point of view. Such advocates, in addition to presenting their side of the case, can be very useful in criticizing the cases made by opposing advocates. The requirement for the judges, on the other hand, is simply that they must clearly understand the rules of scientific evidence, have no intellectual or other commitments regarding matters before them, and finally must have the mature judgment needed to weigh the evidence presented. Thus, it is almost inevitable that a scientific judge

would have earned his distinction in areas other than those in which he could qualify as unprejudiced.

It has occasionally been suggested that the advocates should present their points of view directly to the political leaders who have decisions to make. This procedure suffers from the grave difficulty that political leaders will not be able to spare the time necessary to understand scientific debates in sufficient depth to distinguish the relative validity of positions taken by sophisticated advocates. The scientific judge would differ from the political leader sitting in judgment on scientific questions in that his scientific background should enable him to assess more quickly the evidence presented by opposing advocates and to participate in something analogous to cross-examination. He would not, on the other hand, be expected to have the deep acquaintance with the field required of the advocates.

Scientists are traditionally advocates, and in small-scale science judicial functions have never had an importance comparable with that of advocacy. An experiment can always overturn anyone's judgment on a scientific question. However, the judicial function becomes important in large-scale science and technology, when we must anticipate the results of experiments which cannot be performed without the expenditure of great amounts of money or time. This increase in the importance of the judicial function requires the development of a group of distinguished people who will devote themselves to scientific judgment. The point has been frequently made that a scientist needs to keep actively engaged in creative work in order to maintain his expertise. I submit, however, that if a mature scientist is deeply involved in finding the truth between the claims and counter-claims of sophisticated advocates, his education will be continuously improved by the advocates and he will be continuously mentally stretched in the effort to reach wise judgments. Communication from the judges to the scientific community and the public is an essential part of maintaining their expertise and reputation. A provision for publication of judgments, suggested below, will help to accomplish this.

The problems of selecting people to serve as judges and advocates will, of course, be the most difficult matter in reaching wise decisions, under this scheme as under any other. It would be very important that everything possible be done to elevate the positions of advocates, and especially of judges, so as to attract people whose wisdom will match the importance of the judgments they must make.

3. The scientific judgments reached should be published.

In many cases the results of scientific advisory committees have not been made available to the public for reasons other than national security. The existence of such privileged information makes it very difficult for the public to assess the degree to which a mixed decision is based on political grounds.

I would propose that the opinions of scientific judges reached after hearing opposing advocates should be published, within the limits of national security. The publication of these judgments would serve two purposes. First, it would provide the whole political community with a statement of scientific facts as currently seen by unbiased judges after a process in which opposing points of view have been heard and cross-examined. Hopefully these opinions would acquire sufficient presumptive validity to provide an improved base on which political decisions could be reached. Second, the publication of opinions reached by scientific judges would inevitably increase their personal involvement, and thus could help to attract distinguished scientists to serve in the decision-making process.

There is a grave difficulty raised by the traditional conservatism of scientists, even those who have exhibited great imagination and daring in their own work. I have no formula to offer to overcome this bias other than an insistence that the advocates of novel approaches be heard. It is important that they be cross-examined by skeptical experts and that the judges feel a responsibility for not rendering negative judgments on inadequate evidence. It is actually very difficult to offer rigorous proof that something cannot be done, and usually the most that can be said is that "I cannot see how to do it." Scientific judges whose opinions would be published should be more accountable for errors in judgment.

It is very important that this type of formal procedure not be allowed to interfere with the small-scale creative science which must precede any major

decision-making. This work has always been pursued with a wide-spread opportunity for initiative, in a kind of private enterprise, laissez-faire system in which I firmly believe. When large-scale funding is required we must restrict the number of pleas for funds that are made. The question must then be asked, would the formalization of institutions for scientific judgment result in harmful restrictions on initiative? However, the scientific advisory procedures which now exist have also been guilty in this respect, and in formalizing of these procedures we could deliberately try to control this narrowing of the number of alternatives pursued simultaneously as a project grows in size.

It is not my intention here to suggest that institutionalizing communication between the scientific and political communities will of itself lead to effective democratic control of technology, or even that this proposed institution would optimize communication. I would suggest, however, that the achievement of superior communication would help toward democratic control, and that mechanisms for achieving improvements in this communication should be vigorously discussed in both the scientific and political communities.

Technology's Audience Appeal

There is another area of communication between the scientific and technological community and the lay public which could promise vast improvements in understanding. I refer now to the sense of beauty which all creative scientists and technologists feel about some of their own work and about the work of some of their colleagues. The words beautiful and elegant are frequently used in discussing creative work in these communities. However, the sense of beauty as distinguished from the sense of power is rarely communicated to laymen. Although one can find writers devoting themselves to communicating the beauty in primitive technology and a huge amount has been written on the power of modern technology, I know of no example of literary efforts to convey the beauty in, for example, an integrated circuit. I am convinced that science and technology

represent great art forms in our time and the creative energy that is poured into these areas is immense compared to many better recognized art forms.

Perhaps one of the important difficulties in achieving this audience appeal is the dichotomy of the humanities and science in our universities, one result of which is that people who prepare themselves to communicate with the public do not generally become sufficiently conversant with science or technology to communicate its beauty. On the other hand, the education of a scientist emphasizes proficiency in the efficient but private languages of science, which of itself tends to atrophy his abilities to communicate with the lay public.

However, in view of the traditional academic rivalry between science and the humanities, it seems to me inevitable that the education of students who can better effect this communication will have to be the responsibility of scientists and technologists. We must meet the challenge of communicating to the lay public the beauty of a sophisticated invention and the grandeur of a new view of nature.

Need for a Vigorous Defense

Scientists and especially technologists are quite unprepared to undertake the defense of their professions against the vicious attacks currently being mounted against them, some of which I have quoted previously. Many of us behave in a manner that has been repeated by minorities many times in history who have adopted the views of their detractors. Thus, I know many technologists who are unsure about their profession and who are quite unprepared to defend its beauty and beneficence. Perhaps we need something analogous to the wonderful "black is beautiful" idea.

I have noticed for example many engineers who are very anxious to make a contribution to relieving the pollution problem. In choosing this area they seek to appease the strident voices who are using pollution to persecute technology. Again, one can find many scientists who have devised another way of appeasing the current attack on technology. We have seen in recent decades the advent of purity as a supreme value in academic science. Thus, science with no visible social impact is elevated to a status beyond that accorded activities with visible consequences for mankind. The practitioners of pure science hope to escape persecution by pretending that they are not contributing to "the disaster that scientific technology has produced." Of course, this pretense is pretty thin, but it does provide some shield from their critics.

At the present juncture scientists and technologists must together reaffirm:

—That science-based technology has improved not only mankind's conditions of life, but mankind itself;

—That there is no other choice in this world but to continue to foster a vigorously growing science-based technology;

—That the secondary problems, pollution, side effects, etc., can easily be met, if the will is there, by our enormously powerful technology;

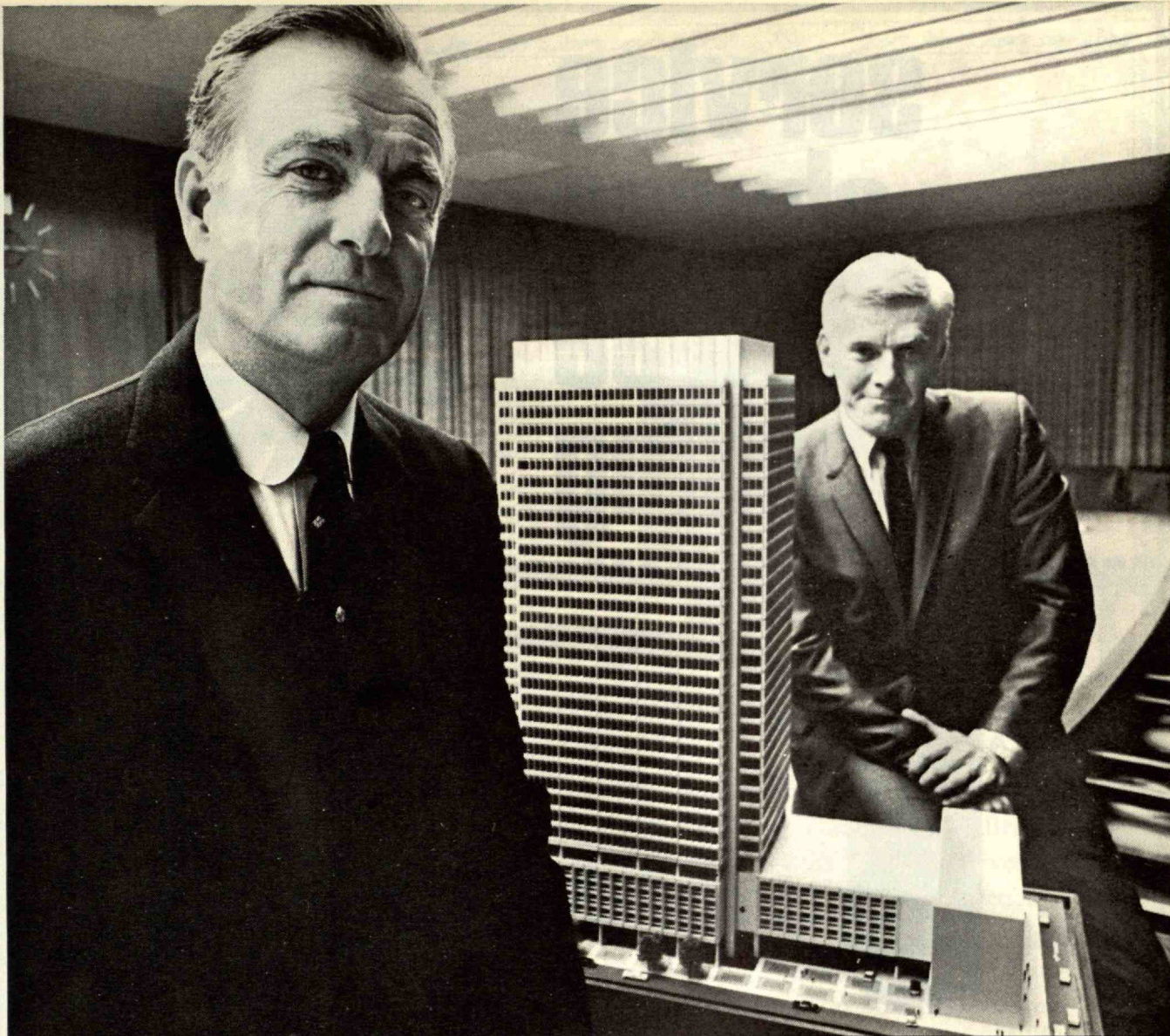
—That science-based technology is one of the great creative forms of our time;

—That real and justified fears of modern technology, problems which cannot obviously be met by more technology, should be treated as powerful stimuli for social growth;

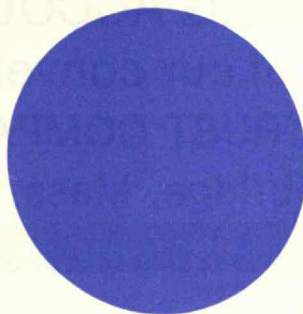
—That instead of facile predictions that nuclear weapons, computerized abolition of routine labor and still more dramatic things to come will inevitably result in disaster for mankind, we should call for the vision of a society which had advanced enough to meet these challenges.

It is my belief that the promise of the application of science and technology to the continuous improvement of mankind is still largely to be fulfilled, that we can see an ever increasing opportunity to create a world limited only by our own imagination. The current reaction against science based technology is destroying this vision and strenuous efforts must be made to unify science and technology and establish communication channels that will again make its promise bright and clear to everyone.

Arthur Kantrowitz, formerly a member of the Cornell University faculty, is one of the nation's distinguished industrial scientists. He is known for research in physical gas dynamics and particularly for his pioneering application of the shock tube to high-temperature gas problems; for leadership of the Avco-Everett Research Laboratory devoted to magnetohydrodynamic studies and related work; and for his thoughtful contributions to the development of public policy for science.



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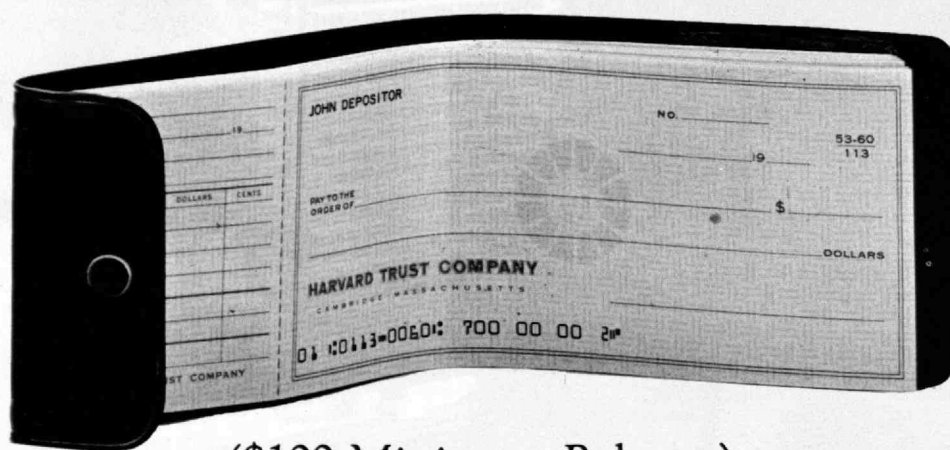
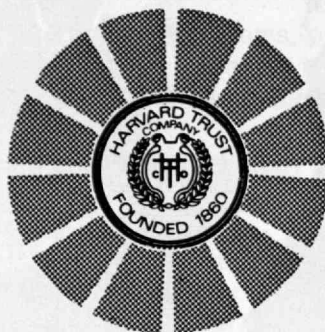
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Trend of Affairs

Towards Agreement on Satellite Politics

The politics of satellite communications may soon catch up with space technology. That's the impression most delegates to a recent international meeting in Washington took back to their governments.

The delegates—representing nearly 100 nations—pondered four weeks over various plans for a permanent organizational charter for the International Telecommunications Satellite Consortium (Intelsat). The charter preparation was not completed at the initial meeting, and the delegates plan to return to Washington in November for the finishing touches.

Conference participants think solutions to the political questions can be found at the fall meeting. The reason for their optimism is that Intelsat, under a five-year-old interim agreement, has enjoyed an impressive measure of success.

The 68-member organization (they were joined at the conference by 28 other countries, including the U.S.S.R., as "observers") now has satellites operating over the Atlantic, Pacific, and Indian Oceans. Thirty countries have access to ground terminals located in 15 countries. Twenty additional terminals are under construction.

Indeed, no one questions whether Intelsat can handle the technical design and operation of a global satellite system. But the political questions are sensitive and nationalistic feelings are running high.

The two toughest issues facing the Intelsat partners are how to persuade the Soviet Union and its Eastern Europe allies to join the group, and whether to continue the Communications Satellite Corporation as the system's sole manager.

The issues are related. The Soviet-bloc countries are demanding, as the price for joining the system, an end to Comsat's dominance. They are basically fearful of any organization that depends on the benevolence of the United States. At the same time, Western European countries are also calling for a weakening of Comsat's role. Their prides as world powers are tender, and they

have a yearning for more experience for their countrymen in satellite operation and construction.

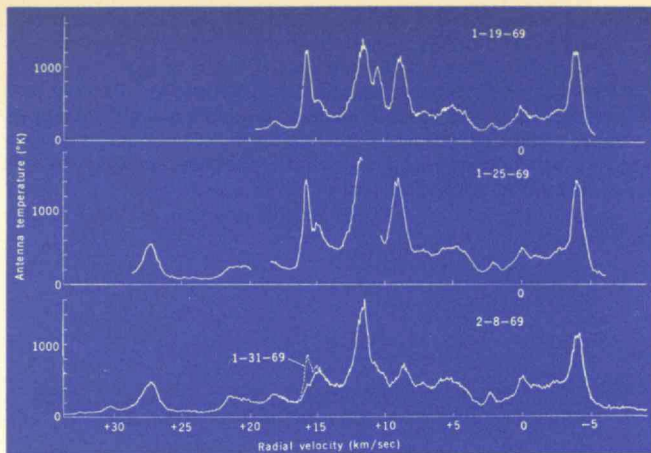
Comsat, the chosen entity of the United States in Intelsat, is the owner of slightly more than half of Intelsat. The ownership formula, under the interim agreement, is based on the amount of international communications traffic originating in a country. Comsat is the system's manager and secretariat. As a compromise, near the end of the conference, it was suggested that Comsat continue only as the manager of technical and engineering matters and that a separate international secretariat be established to handle legal, financial and administrative matters.

Other points of compromise might be to have Comsat step up efforts to add foreign nationals to its staff, increase the flow of research and development data among member countries, and actively seek spacecraft equipment suppliers outside the United States (presently, 65 per cent of Intelsat's procurement is in the United States).

One of the stickiest problems facing the delegates was apparently resolved at the meeting. They informally agreed that any member could build a regional or domestic system if it were coordinated with Intelsat. This issue is quite important to countries with large land masses. The Soviet Union, Canada, India, Brazil, Australia, and the United States have hopes of establishing domestic systems.

The Soviet Union already has its Molniya system in operation. Unlike the geo-stationary Intelsat spacecraft, the Molniya is in a medium altitude, random orbit. This permits coverage of northerly portions of the U.S.S.R. which cannot be adequately served by a satellite like Intelsat's over the Equator. Some Canadian and Alaskan areas share this problem.

Additionally, the Soviet's Molniya is larger and more powerful than Intelsat satellites (which must be smaller to be launched into the higher altitudes) and therefore can be accommodated with smaller ground terminals—as small as 36 feet in diameter.



Spectra of the H_2O source in W49, showing: the variations with time (suggesting that the object is less than 20 light-days across); and the relative velocities implied by the frequency shifts. (From *Science*, March 7, 1969)

Do Planets Form From Water-Masers?

Dr. Charles H. Townes, who shared a Nobel Prize for his pioneering work on the laser principle, is one of a group of researchers who now report the existence of a new kind of astronomical radio-emission, which may possibly come from a sort of maser. The essential property of the object in question—of which there are at present eight examples—is that it emits a radio spectrum characteristic of water. It seems hard to account for its intensity without some sort of maser action. The most dramatic suggestion about these water-objects is that they may be the makings of planetary systems. However, Dr. Townes and his colleagues, in their paper on the discovery (*Science*, March 7, 1969, p. 1055), confine themselves to envisaging “stellar formation or activity.”

The report is by two radio-astronomers at the E. O. Hulbert Center for Space Research, Washington—S. H. Knowles and C. H. Mayer—and three scientists at the University of California, Berkeley, namely A. C. Cheung, D. M. Rank, and Townes. The Berkeley group were among those who reported the first four of these water-objects, earlier this year. Four others were soon found (one by M. L. Meeks of M.I.T.'s Lincoln Laboratory), and all eight have now been studied with the 85-ft. radio telescope at the Navy's Maryland Point Observatory, at a wavelength of 1.35 cm.

The three brightest ones seem to be less than seven minutes of arc across, and the rest one minute or less. One of the largest of them, associated with a radio-source called W49, seems to be varying rapidly in brightness, which suggests that the true size of the emitting regions is very much smaller than this (given the distance of the W49 radio-source itself). However, the water-spectrum emission is so intense that even if the object is really seven minutes across, its temperature must be $50,000^\circ\text{K}$, at least as regards radio brightness. The spectrum offers another measure of temperature which is quite reasonable—the spread of some of the spectral lines implies that the emitting molecules are moving about in the gas at speeds corresponding to about 100°K . The team think that the real temperature of the water vapor is higher than this, but, nevertheless, far lower than the

very high temperatures implied by the radio brightness, and they account for the latter by proposing that the water vapor is being raised to an excited state and emits in a maser fashion. The mechanism of excitation presents problems, but not insoluble ones, apparently.

However the radiation is produced, it has one more interesting characteristic. The spectra contain Doppler shifts which imply that parts of each object are moving, relative to one another, at many kilometers a second. These patterns of velocity suggest that the vapor is in the form of a ring, which is either rotating, expanding, or contracting. A rotating ring of gas, on a more-or-less stellar scale as these objects are, is at once suggestive of a planetary system in formation. The *New York Times* quoted one astronomer—a specialist in solar system evolution—as saying that it may now be possible, during a human lifetime, to piece together, observationally, the story of the origin of a planetary system.

The Diffuse Mind of Supermarket Man

Those who sell us their merchandise, like those who solicit our votes, put a great deal of effort into discovering how we go about choosing product A rather than product B. There is a continuing search for mathematical models of our collective behavior that will accurately predict the public reaction to some stimulus, be it a speech or a shampoo. Neither the electoral nor the mercantile researchers have yet approached their ultimate goal very closely. Of the current state of the art in the mercantile field, something can be learned from a recent paper from the Sloan School of Management—339-68, *Stochastic Consumer Models: Some Comparative Results*, by David B. Montgomery, Assistant Professor of Management—now published in *Marketing and the New Science of Planning* (edited by R. King; Chicago, American Marketing Association).

The paper describes four recently proposed models of brand-choosing behavior, and tests them according to how well their predictions conform with the buying of Crest dentifrice in the period between January, 1958, and April, 1963. The purchasers were divided into four categories—on the basis of how often they purchased

—and the data was further divided into two periods, before and after Crest was endorsed by the American Dental Association (August, 1960), giving eight sets of data in all. Each model of the populace was tried against all eight histories. One of the four models in fact achieved “a good fit in all but one case,” one scored six out of eight, and the other two were pretty poor (although “we must be careful not to over generalize our results from this one comparative study”).

To study the models is to see ourselves as others see us. First, the Brand Loyal model: each consumer has his own probability p of buying brand A the next time. If he in fact buys brand A, his probability of doing so again remains what it was. If he buys another brand, p is reduced by a factor k , which is the same for everyone. If, in spite of this reduced probability of doing so, he switches back to brand A, his probability of then continuing to buy brand A is restored to p . Thus, he has two possible probability states, and which of them he adopts depends on what he bought the last time.

This model fitted only four cases out of the eight “reasonably well.” But it was better by far than the Last Purchase Loyal model, although the distinction between the two is rather subtle. The Brand Loyal model allows the possibility of k being anything up to unity, which means that there are people who always prefer brand A, with an allegiance that may be little or nothing lessened by their experience of another brand. In the Last Purchase model, each purchase is governed *primarily* by the previous one. The model allows, in one extreme version, for the possibility that one’s preference is always for whatever one bought last, independent of what it was; in its general form, it does allow for some such dependence—one brand has more of a grip on its latest purchasers than another. That the Last Purchase Model indeed differs from the Brand Loyal model is proved by the fact that it gave “a very poor fit,” with only one exception out of the eight.

Now we come to the models that worked well. A score of six good fits went to the Linear Learning model. This is rather a flattering model, in that it allows us to learn by experience, cumulatively, in a world in which nearly all products are pleasant but some are more pleasant than others. It is rather like the Brand Loyal model, but far more complex. The buyer’s probability of choosing brand A is a linear function, not of what he chose last

time but of what his probability was on that occasion, and it is updated at each buying. Furthermore, there are two such linear functions; which of them applies, depends on what the buyer actually chooses. In other words, his preference changes every time he buys, and how much it changes depends on what he buys. Preferences can change progressively, by discrete steps, in either direction.

Finally we come to the model that worked best of all, the Probability Diffusion model, which fitted the facts in every case but one. Here again, the probability of buying brand A can rise or fall progressively—but is not in any way influenced by differences between A and its rivals, as experienced by the consumer. In this account of the human condition, “the change in a consumer’s brand choice probability results from other factors.” We may certainly come to like brand A more or less, but not as a result of actually consuming it, having just bought some of it.

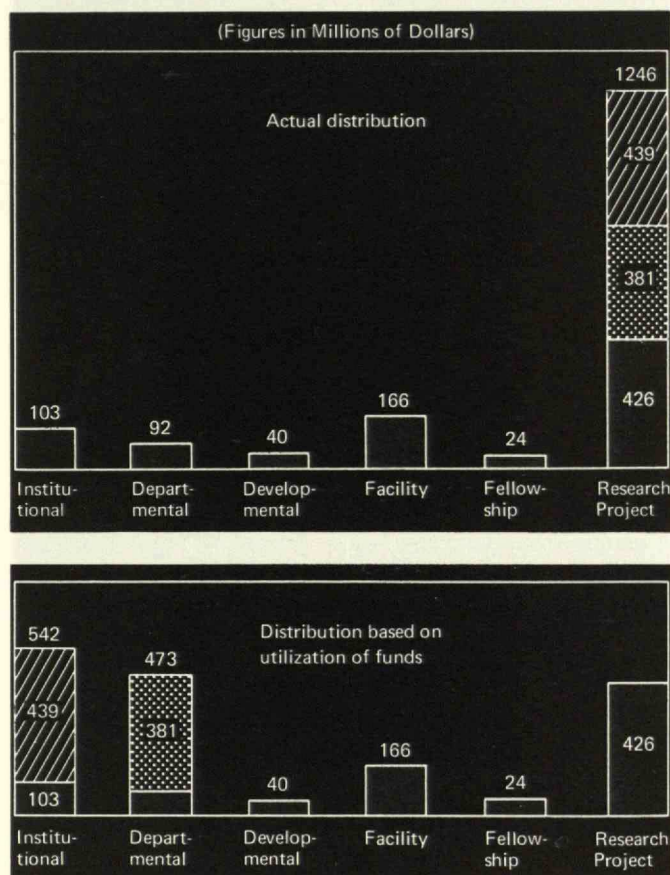
However, in a footnote we learn that Professor Morgan Jones of the University of California, Los Angeles, is working on a combination of these two last-mentioned models.

A National Policy for Graduate Education

“It is the policy of the United States that the Federal Government, in cooperation with State governments and all other participating institutions, shall encourage and financially support the conditions essential to graduate education: the fruitful and mutually strengthening association of student and teacher, of research and instruction, and of the graduate institution and society.”

The National Science Board recently recommended that this policy statement be accepted and implemented by the U.S. government in order to insure adequate growth in the crucial area of graduate education in the sciences. Irwin Sizer, Dean of the Graduate School at M.I.T., is strongly in favor of adoption of this national policy. “If pursued, this plan will mean growth and improvement in graduate education. Quality and size must come together. Good graduate education must be linked

The top chart shows the actual distribution of federal funds to university science research and education in fiscal year 1966. The second chart shows the approximate distribution that would have resulted from the employment of programs suggested by the National Science Board. The striped area represents funds that are used for institution expenses while the dotted area represents funds for departmental use. (From *Toward a Public Policy for Graduate Education in the Sciences*, National Science Board, 1969.)



to a strong research program; research is expensive and difficult to do on a small scale."

The policy would be implemented by the creation of a single federal agency responsible for handling money for graduate education as a whole. Funds would be made available to institutions through six categories—institutional sustaining grants, departmental sustaining grants, developmental grants, graduate facilities grants, graduate fellowships, and research project grants.

Emphasis would be placed on institutional and departmental grants, rather than the present use of research grants for specific projects. Dean Sizer noted that one third of M.I.T. graduate students are on research grants while only one sixth have federal fellowships. "A change which would create fellowships through institutional and departmental grants would allow students and professors greater freedom to pursue research of

their own choice. At present a student must sometimes do his thesis on a topic where funds are available, and it may not always be in the area of his prime interest."

Another advantage of a national policy and single funding agency, Dean Sizer points out, is continuity of funding over a number of years and in all fields. At present, there is unfair distribution among different disciplines and a great deal of fluctuation in the amount of funding for any particular field. He cited the example of space research at M.I.T.: a new building was financed and built and fellowships distributed; then the facilities were inadequately utilized because of a sudden cutback in funds.

While the present crisis in scientific financing would be eased by a policy for continuous graduate education funding, lack of money is not the only hindrance to the improvement of graduate schools. "M.I.T. has five per cent fewer graduate students this year (a total of 2,993) than last," said Dean Sizer, "because of the new selective service policies. Usually the number grows two to five per cent. Adequate size is essential to a quality graduate school so this is a serious setback." Perhaps with government recognition of the importance of graduate education to the growth of the nation, this problem will be alleviated.

On this question of size, Dean Sizer disagrees with a recent study at Harvard University which proposed a cutback from Harvard's present graduate arts and sciences enrollment from 3,000 to 2,400. It remains to be seen whether or not Harvard can carry out this policy in view of the expanding needs for graduate education.

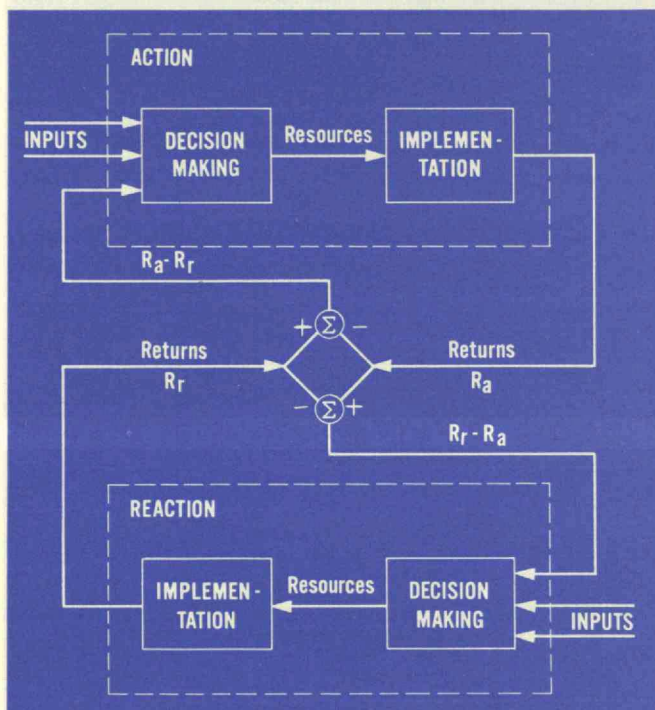
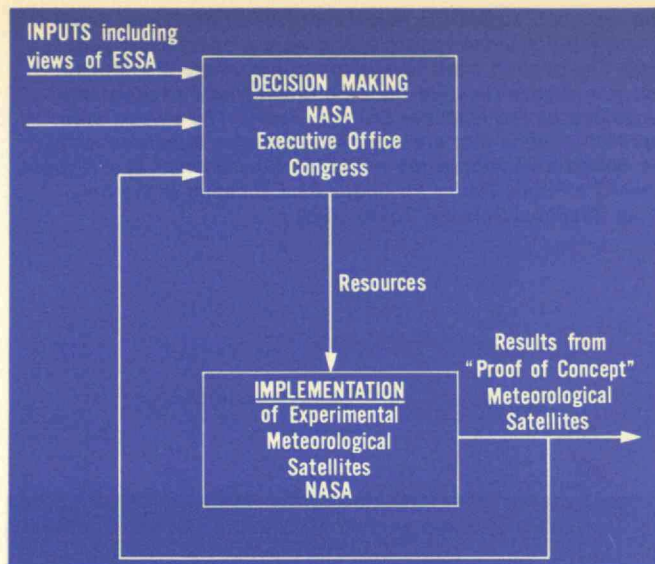
The National Science Board Report is a crystallization of the thinking of experts in the field of science education. While they are in general agreement about a national policy for graduate education, the very difficult task of convincing the government of the urgent needs in this area lies ahead. The policy is excellent in principle; making it fact may take a long time.

Actions and Reactions in the Space Program

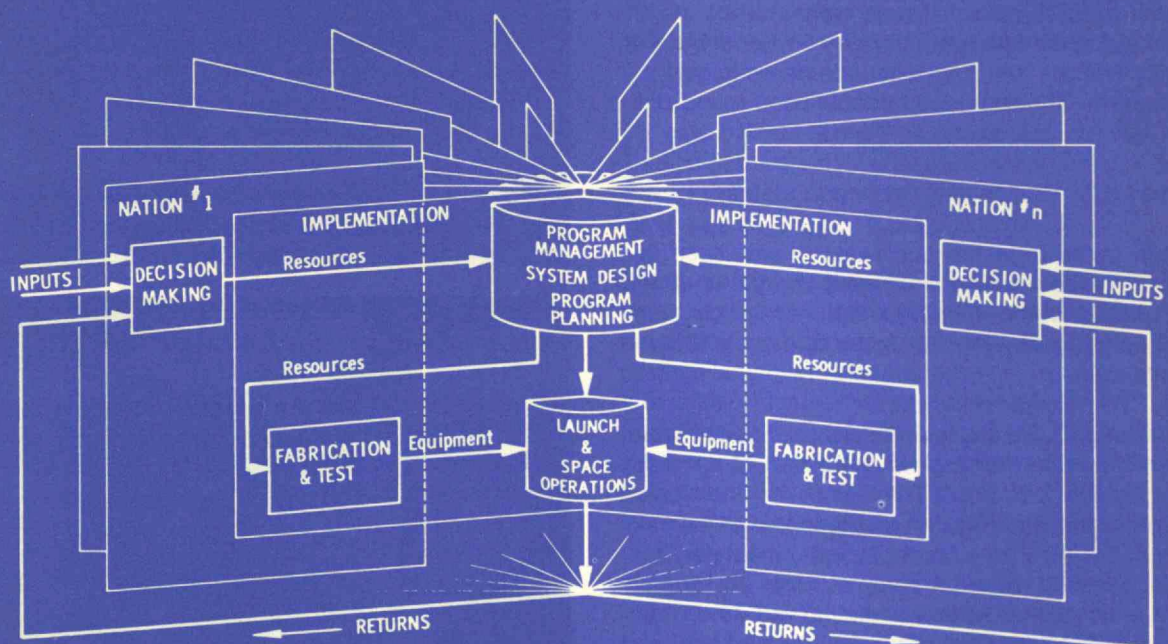
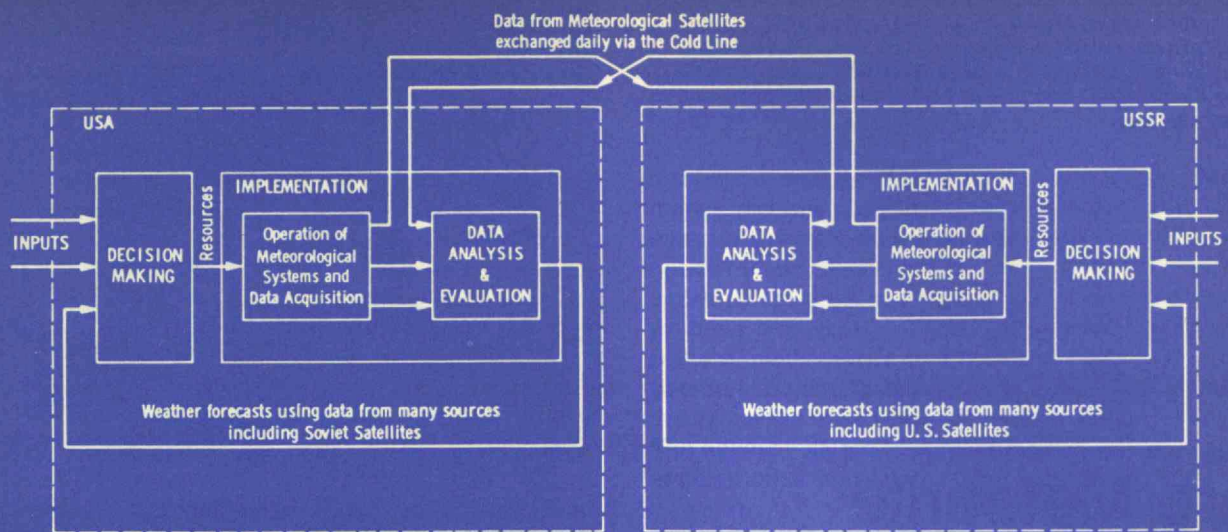
The Minta Martin Lecture, delivered each year in a number of aeronautical centers by M.I.T.'s Hunsaker Professor of Aeronautical Engineering, was this year devoted to the U.S. space program—its history, its modus vivendi, and its purposes. This year's Hunsaker Professor is Dr. Robert C. Seamans, Jr., who joined the National Aeronautics and Space Administration in 1960 as Associate Administrator, and is now Secretary of the United States Air Force. He is a graduate of Harvard and M.I.T.

In the early part of the lecture, Dr. Seamans described U.S. reactions to, first, the "tremendous shock" of Sputnik (which resulted in the "Space Act" of 1958 and the formation of N.A.S.A., with the object of carrying out, in President Eisenhower's words, "an aggressive space program that will produce important civilian gains in general scientific knowledge"); and then to the orbiting of Yuri Gagarin, following which the N.A.S.A. budget for fiscal 1962 was revalued to \$1.825 billion from a pre-Gagarin \$1.235 (the latter figure includes \$0.14 billion that had been requested by President Kennedy to start work on Saturn I, not allowed for in the original Budget Bureau figure for 1962). The "terrific amount of debate" that went on during this transmutation was not without its humor. The estimate that the Russians were capable of going for a lunar orbit prompted the Department of Defence to suggest that a manned lunar landing might not be ambitious enough, and that manned planetary missions should be attempted. And at one point, in the summer of 1961, when Senator Proxmire of Wisconsin attempted to reduce the scope of N.A.S.A.'s activities by inserting two amendments, he found himself faced across the floor of the Senate not only by Senator Kerr but by Dr. Seamans as well, whispering relevant facts into Kerr's right ear. Dr. Seamans told an amused audience that Senator Kerr's grasp of these facts was not always perfect, but "he continued the argument without a pause. The final vote was heavily against Senator Proxmire's amendments, but this was not always the case in subsequent years."

Dr. Seamans went on to describe the structures of decision and result underlying the activities of a body such



as N.A.S.A. The simplest structure is a simple feedback loop (first diagram), comprising a decision-making process and an implementation process, with the results from the latter feeding back into the former to influence subsequent decisions. The next structure is that of competition between two such organizations, assuming that both want the same results and each is "determined to preempt the other." What is fed back into the decision-making process of each is then not its own results but the difference between them and the results obtained by the competitor. If a single type of task is the object of such competition, "the capability of each competitor escalates until one of them withdraws from the competition." Dr. Seamans showed graphs depicting this escalation, but could not be sure how closely the Russians conformed to their share of his predicted picture. In fact, he said, the situation is more complex than this. Each side is attempting a number of tasks, and is laying different weights on each. Some activities are done in competitive, linked-loop fashion, others are done with-



out reference to competitors, so we arrive at a structure comprising elements of both types of loop.

Dr. Seamans went on to examine the more complex structure of cooperative action. The first example was the exchange of meteorological satellite data with the Russians (third diagram). This situation does not lead to escalation; if one side cuts off the flow of data, so can the other, and that is the limit of possible uncharitableness. Another form of cooperation, so far attempted only between political allies, rests on the exchange of engineering information, with joint launches. Dr. Seamans noted that such schemes have worked well when they have been simply bilateral, but that multilateral efforts of this kind, notably the European Launch Development Organization, have not been so successful. As a solution to the "ELDO problem," and as an explanation of the workings of Intelsat, Dr. Seamans produced the structure shown in the last diagram, centered on a single program management team.

Top, opposite page: Example of activity guided by its results, undertaken by two agencies with overlapping authority.

Bottom, opposite: Competitive action guided by superiority of results over those of competitor.

Top: Joint action in which results (data) are exchanged.

Bottom: Multi-national action with a single program manager.

Right, below, a close view of a sample of the rare meteorite, Type 3 carbonaceous chondrite, photographed after a spectacular Mexican meteorite shower in February. Prumencio Garibay, at right, displaying a large meteorite found in Hacienda de Santa Anna, was one of hundreds of Mexicans who collected samples.

Rare Meteorite Falls on Pueblito

The citizens of Pueblito de Allende were startled out of their sleep just after midnight February 8 when a blazing white fireball lit the sky and a thunderous explosion shook the earth. The frightened people soon found out that their town in the plains of Central Mexico was in the center of a meteorite shower, which attracted scientists from all over Mexico and the United States.

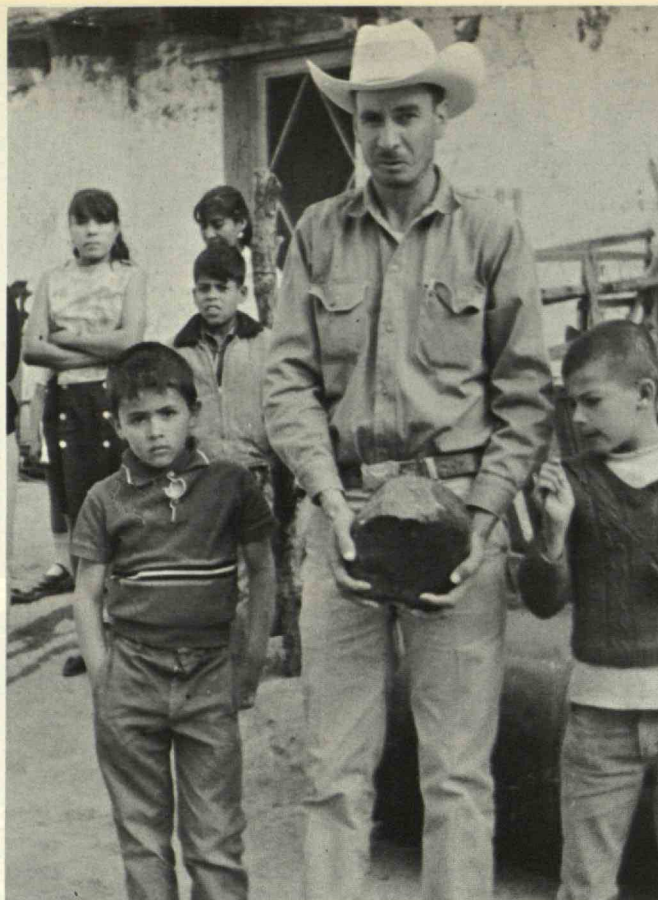
The fireball came from the northwest (it was seen in Arizona and Texas heading southeast) and broke up into two large pieces which then exploded, rather less than a second apart, spreading the material over a 10-square-mile area.

Within one hour of the explosion scientists began what is probably the most thorough investigation of a meteorite which has ever occurred. The Center for Short-Lived Phenomena of the Smithsonian Institution, with the cooperation of the Air Force, sent planes immediately to search for possible ablation samples from the fireball still in the atmosphere. After calculating the wind direction and velocity at the time of the fall, they located and collected samples of atmospheric dust by special filter traps on a B-57 flying in the area.

American and Mexican scientists who rushed to the scene found 1000 pounds of samples ranging in size from tiny "peas" to a 40-pound specimen which just missed hitting the local post office. Dr. Elbert King of N.A.S.A., the first American to arrive, reported finding a piece of meteorite: "It is a very beautiful stone, quite full of chondrules of various sizes, very dark and looks like it could possibly be carbonaceous."

Samples found throughout the region and rushed to laboratories in the United States for examination showed that the material was a special and rare type of space dust known as Type 3 carbonaceous chondrite which is believed to contain traces of extra-terrestrial organic matter.

Scientists are still analyzing the chemical make-up, radioactivity, and other aspects of the meteorite, which may once have been an asteroid whose origin dates



back to the beginning of the planetary system. The experiments being performed may provide information about the history and evolution of the solar system.

While they do not expect anything startling to be discovered, scientists can study a fall of this size only about once every five years. There may be half a dozen falls a year all over the world, but most go unnoticed, and usually nothing is left but a small stone after the meteor has been ablated down in its journey through the atmosphere.

Meanwhile, in Pueblito de Allende and surrounding villages, the local inhabitants have recovered from their original fear of the meteorites. Citizens sport samples as good luck charms and are capitalizing on the event by catering to visitors and by searching for valuable samples.

The Mathematician Explains Himself

Faced by uncertainties in future funding, scientists of various disciplines have been hard at work publishing reports which justify their activities and delineate the regions in which support is most sorely needed. The turn of the mathematicians came last year, when the National Academy of Sciences' Committee on Support of Research in the Mathematical Sciences (COSRIMS) published a weighty document simply entitled *The Mathematical Sciences: A Report*. However, mathematics is a peculiarly inaccessible subject to the nonscientist, and—as the Committee puts it—“even scientific readers of our report, let alone nonscientists, may feel that they are not adequately informed about what mathematical research, especially modern mathematical research, consists of.” And, they add, what it is good for.

They have therefore produced now, as background, a remarkable collection of essays, *The Mathematical Sciences* (M.I.T. Press), explaining some of the newer forms of mathematics, their uses, and their fascination. The essays vary as widely in style, ease of reading, and viewpoint as they do in subject matter. The most difficult should present no problems to anyone who has graduated in engineering or the physical sciences, while many are completely accessible to the total layman.

One of the most impressive achievements in exposition is an essay by Columbia's Professor Lipman Bers, with the unpromising title “Complex Analysis.” Starting at ordinary quadratic equations, he takes just seven lucid pages to get to “the most challenging and difficult problem in today's mathematics” (the proof or disproof of the Riemann hypothesis concerning the complex roots of the zeta function). A couple of pages on conformal mapping takes us to aerodynamics; and finally we are introduced to recent developments in the theory of functions of several complex variables, and told of the applications of this theory in modern physics.

Professor Bers (who is the Committee's chairman) ends with a reference to an essay on “Analytic Functions and Elementary Particles,” by Professor A. S. Wightman of Princeton. Professor Wightman's style of thinking makes particle physics experiments seem almost childishly simple (do mathematicians think of the rest of us as being rather dim?). His account of the mathematics that is required to make sense of the results of such experiments is not easy, but it is certainly entertaining once one gets into it.

Another author who, like Bers, takes the reader a long way from easy beginnings is Professor Andrew Gleason of Harvard. He carries us almost effortlessly through an inherently difficult story—“The Evolution of Differential Topology”—by means of a series of appeals to intuition. His definition of topology is itself intuitive and may come as something of a surprise (one sees instinctively not only what it is, but why it is useful). Simple, natural-language reasoning takes us through a series of intriguing theorems, and thence to differential topology. Inci-

dentally, Professor Gleason starts his treatment with a good rousing paradox—that the reason it is so difficult to convey modern mathematics to the nonspecialist is that “mathematics is an easier subject than the other sciences.”

Not all the authors have the same wide vision. Some merely present excellent plain-man's guides to fields where many plain men fear to tread, like non-Euclidean geometry and linear programming. The latter are balanced by the presence of such great teachers as, for example, Freeman J. Dyson, whose discussion of the place of mathematics in the physical sciences first appeared in *Scientific American* in 1964. (All but three of the 22 essays were specially written for this collection. The editing was assisted by George A. W. Boehm, who is no stranger to readers of this journal.)

All in all, the mathematicians have done a surprisingly good job of bridging a wide-open gap. It is not given to scientists to command support, but in their efforts to show that they deserve it, the mathematicians have done more—they have explained themselves.

Fourier Spectroscopy Without Delay

The term “spectroscopy” usually evokes the idea of light coming through a very narrow slit, to be split up according to wavelength, giving a spectrum that shows at once which wavelengths were in the light, and at what intensities. This sort of spectroscopy runs into difficulties if the light source is very dim, or if one is working in the infrared where good detectors are a problem. One way out is Fourier spectroscopy: the light is passed instead through a Michelson interferometer (with a much wider aperture than that of a spectroscope), from which a sequence of interference fringes emerges. This is not a spectrum but contains the same information, in a form which is known to mathematicians as a Fourier transform. To the aperture advantage is added a more subtle one concerned with noise level.

To turn the interferogram into a normal spectrum takes a good deal of mathematics, and this takes time. The amount of time it takes has now been reduced quite dramatically, by Dr. Joseph E. Hoffman, Jr., of the Air Force Cambridge Research Laboratories, Hanscom Field, Mass. He has devised a system which calculates the spectrum and draws it while the interferogram is being produced—a process taking only a few minutes. Hitherto, the most successful method has been to get the interferogram into digital form and feed it into a high-speed digital computer programmed for Fourier transformations. This is rapid only if a powerful enough computer is immediately available. Dr. Hoffman's system, on the other hand, could be developed into an instrument compact enough for use on balloons or satellites.

The making of an interferogram is a matter of gradually altering the difference between two light paths in the

interferometer, progressively accumulating a series of fringes. Even a short series of fringes gives, after transformation, a sketch of the whole spectrum, albeit crude. (To take the simplest example, a spectrum containing a single wavelength would appear in the interferogram as a perfectly regular fringe pattern—the more fringes observed, the more accurately would the wavelength be defined, but a very few fringes would define it after a fashion.)

Dr. Hoffman's system consists essentially of two parts, one to sample the growing interferogram and work out what sort of spectrum it implies, the other to add together these partial sketches of the spectrum. The first part uses analog circuitry, the second digital. The result is accurate in amplitude to within two per cent of the full scale, and in frequency to within 0.1 per cent of the bandwidth being studied. The latter figure arises from the fact that the spectrum is displayed as 1000 point values; also, the interferogram is sampled at 1000 points. The system was built to be portable, for use with a variety of interferometers, but was not itself aimed at compactness. The present version—"a prototype of a new class of spectroscopic systems," says Dr. Hoffman at one point in his lengthy report—uses many readily available components, where a fully developed system would be more demanding. For instance, the amplitude accuracy could be increased by a factor of four, and there is much to be done in the way of using integrated circuitry to reduce size and weight.

Although this work was mainly aimed at infrared uses, there is no reason why it should not also be applied in the visible range, says Dr. Hoffman. He has tried it at wavelengths ranging from the far infrared to the green, the chief modifications being sampling speed and type of detector. A final point in favor of the Hoffman instrument is that it restores spectroscopy to its original condition, in that the experimenter can actually watch the spectrum as the optics gathers it in.

An Early Test for Cancer?

It is often remarked that the majority of cancers could be treated successfully if only they were detected early enough. But as yet no general test exists that could be applied to the population at large, to discover people in whom cancerous growth had only recently begun. Considerable interest, therefore, attaches to further progress in the isolation of a substance in cancer serum reported by Dr. Ailene Herranen, of the Worcester Foundation for Experimental Biology, Shrewsbury, Mass., and described at a meeting of the American Association for Cancer Research held in San Francisco in March.

Based on previous work at the Foundation by Dr. Dean Stevens with a variety of animals, Dr. Stevens had tested about 300 human patients, some with cancer and some without. Those with cancer were identified correctly with 94 per cent success. The test must be applied to much larger numbers of people before it can finally be ac-

cepted as reliable, but these early results—taken together with the animal experiments—are certainly promising.

The test consists essentially in incubating tumor cells from hamsters in a medium containing blood serum from the patient together with the female sex hormone estrogen. The hamster tumor cells are abnormal in being multinucleated—a departure from the normal process of cell division and growth. After incubation, the proportion of multinucleated cells is seen to be reduced, by between 30 and 50 per cent, if the blood serum was from a cancer victim. In other words, the blood of people (or animals) suffering from cancer contains something that has a normalizing effect on hamster tumor cells.

What this substance is remains a problem. If the active component in the serum of cancer patients can be identified and analyzed, it may be possible to develop a less cumbersome test for it. The present routine, with an incubation period of a few hours followed by visual cell-counting, is too time consuming to be applicable to whole populations. Mass screening tests (such as the mass x-ray checks now in use) must take only a few minutes. But Dr. Herranen hopes that the work may lead to a general screening test for cancer.

Safety Meter for Uranium Mines

In 1955, a survey of uranium miners brought to light in cold figures the previously suspected fact that radioactive particles in uranium mines were carcinogenic. According to one estimate by the Atomic Energy Commission, some 150 uranium miners have died of lung cancer directly caused by their mining activities. At the time of the survey, the Department of Labor investigated a safety standard for concentration of radioactive particles in mine air known as the "working level."

Starting on January 1 this year, the Department has ordered a more rigorous safety standard for mines, cutting the allowed level of radioactive particles in the air to three tenths of a "working level."

A major problem in enforcing these standards has been the difficulty of measuring the levels of radioactivity. At present, measurements are made manually by a process which takes an hour to produce a reading and requires samples of the mine air to be removed from their collection site for analysis.

Now, Dr. G. L. Schroeder of M.I.T.'s Radioactivity Center has designed a new instrument which gives an instant measurement, in units of working levels, of the content of radioactive particles in the air at any location in a uranium mine.

The meter, weighing about 15 pounds and the size of an attaché case, includes an air filtration system, a three-channel pulse height analyzer and a miniature analogue computer to convert measurements into working levels.

A safety engineer can carry it from one point to another in a mine to obtain information on the state of an area's ventilation.

The Atomic Energy Commission, which sponsored development of Dr. Schroeder's meter, tested it in laboratories at M.I.T., at its Health and Safety center in New York City, and at mines in New Mexico and Ontario. The commission, which plans to have five prototypes built at \$4,000 to 5,000 dollars a piece, claims that the meters will become "vital tools for uranium mine ventilation engineers."

The Pinhole Steam Microscope

Almost anything that passes through or bounces off objects in an orderly fashion can be used to examine those objects (an extreme example being the structural investigation of Egypt's pyramids with cosmic rays). Furthermore, anything that spreads out after leaving an object (again, in an orderly fashion—light is useful because it "travels in straight lines") can be harnessed into some form of microscopy. Thus we have not only light microscopy and electron microscopy, but also more than one form of ion microscopy, using very small samples and large electric fields. Now Professor John G. King, of M.I.T.'s Physics Department, is attempting to use water molecules.

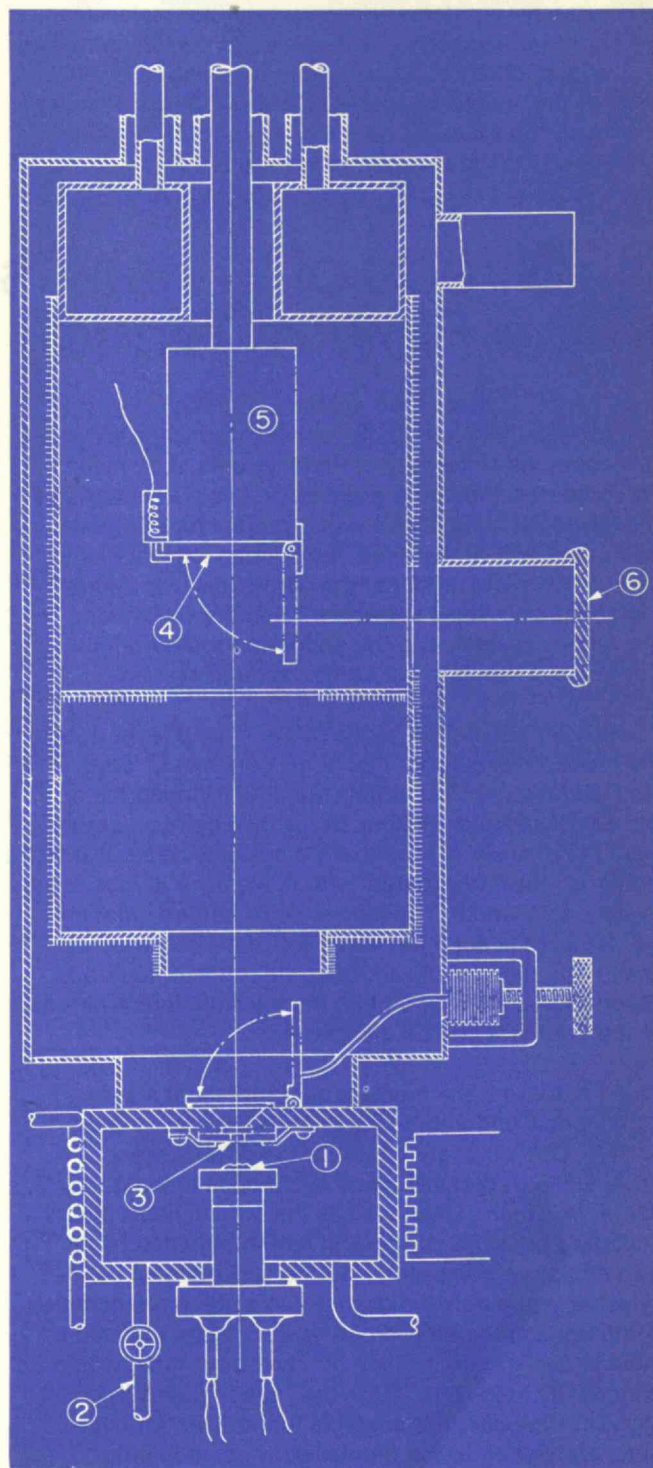
The chief advantage of neutral molecules is that their interaction with the sample does not involve electrical effects, but only much gentler ones like the Van der Waals forces. They should thus give us a new view of things. A major advantage of water is that it should be possible to use it to examine biological materials—hopefully, at very high magnifications—without in any way denaturing them.

Dr. King has already built a system which is essentially a water-molecule pinhole-camera. The sample, at room temperature or a few tens of degrees below, is contained in a chamber into which water vapor is admitted at very low pressure. Molecules land on the sample's surface, perhaps remain there for a time, and take off again. Close to the sample is a small aperture, leading to a larger vacuum chamber. Those of the molecules that, leaving the sample, pass through this aperture, radiate out from it so as to make a pinhole-camera image on a screen. The screen, being at the temperature of liquid nitrogen or below, freezes the arriving water, thus fixing the image.

Developing an image that consists of a very thin layer of water presents considerable problems. After experimenting for a time with various dyes, with only limited success, Dr. King is now working on a different type of detector—a scanning electrical probe. This is simply a needle-like electrode, at a high enough voltage to ionize water molecules moving past it. Ionizations result in a current, which is picked up by the needle and is a measure of the flow of molecules in that part of the

The "cold-screen" molecular beam microscope:

1. Sample
2. Inlet for water vapor
3. Aperture
4. Detection screen
5. Cold trap freezes water on screen
6. Read-out system



beam that is being inspected at a given moment. By scanning the electrode across the beam, a picture containing 10,000 elements at five levels of intensity can be built up in a few minutes. When displayed, "it looks like a moderately good television picture," says Dr. King.

The use of a pinhole is as great a limitation as it would be in light photography. The pinhole has to be a good deal smaller than the resolution of the instrument, which means using only a tiny fraction of the available molecules. However, Dr. King is convinced that a focusing lens for water molecules is perfectly feasible. It would be electrical, and would act on the molecules by taking advantage of their dipole nature. It should be possible to make an objective with an aperture of around a millimeter and a focal length of a few millimeters. There will of course be problems—for example, the molecules arrive at the lens with a wide range of speeds, resulting in a sort of chromatic aberration; one way of getting around this would be to use the time-of-flight principle, changing the focusing power of the lens as first the faster and then the slower molecules reach it.

Hundreds of Variables in the Flow of Blood

A computer model of the human circulatory system could be the result of a six-year-old computer simulation project at the University of Pennsylvania. A \$2 million National Heart Institute grant to Dr. Lysle Peterson and his associates will continue the project for five years, and at the end of that time, the 60-man team hopes to have a complete model of the cardiovascular system—including also those aspects of the nervous system, the kidney system, and the endocrine system which control and regulate the cardiovascular system.

"Computer simulation is one of the most powerful tools the modern researcher has at his command," says Dr. Peterson. "It's especially suitable for research on the cardiovascular system. In my own opinion, cardiovascular disease is essentially a systems disease. If we're going to learn how to deal with it, we have to look at the system as a whole. The model we're putting together will let us look at all the variables that affect the system." The number of variables will run into hundreds. By changing a few at a time, the interrelations inherent in the structure can be discovered.

When achieved, the model would represent a substantial new understanding of the human circulatory system. One outcome could be the development of an artificial heart that will react to changes in the demands made on it in the same way as the human heart reacts—including possible changes in tempo adjusted by its own miniature computer. And the University of Pennsylvania group now looks ahead to a still more complex computer simulation project—a simulation planned to include every aspect of the human body which would be affected by long-term (1000-day) space flights. Indeed, says Dr. Peterson, the possible future uses for computer simulation of the human body seem infinite.

Returning to Nature

As Americans get on with the job of redesigning their environment, let them take some hints from nature, says Athelstan F. Spilhaus, President of the Franklin Institute of Philadelphia.

In his address as recipient of the 1968 William Procter Prize of the Scientific Research Society of America, Dr. Spilhaus noted for members of the American Association for the Advancement of Science this winter what he called the "lesson of the trees" from the Montreal architect Moshe Safdie, the designer of Habitat '67. Mr. Safdie noted the spiral pattern of tree leaves in temperate climates, adapted to obtain the most light; the vertical orientation of the desert cactus, to receive least heat; and the silvered leaf of the olive tree, always showing its reflective side to the hot sun. "We must learn to group the elements which make up our environment in the same un-arbitrary way," said Dr. Spilhaus, so that dwellings and public areas receive the sun where it is wanted and shade and shelter each other where needed.

Just as trees shed leaves in winter, our cities need seasonal transformations. In summer we need open space and breeze. "But when the cold winter comes," said Dr. Spilhaus, "we need transparent shelters, lenses covering the public spaces and the open gardens, absorbing the sunlight and protecting from the cold."

Indeed, Dr. Spilhaus said, "we already have fabrics of reflective and absorptive films which may be air-supported and selectively disposed over huge enclosures to achieve essentially complete control over radiation input and output, like the trees."

And there is also the possibility of "chromotropic" building materials. For we should not, he said, neglect "the refraction and reflection of light at surfaces in buildings."

Outside Influences on Cell Nucleus . . .

A set of proteins synthesized outside the nucleus of a cell may control at least some cell activities by regulating the nucleic acid products which initiate them. Dr. Laurence H. Kedes, Lecturer in Biology at M.I.T. and Junior Associate in Medicine at the Peter Bent Brigham Hospital in Boston, has uncovered evidence of this synthesis.

Dr. Kedes became aware of this activity while focusing his attention on how normal cells, particularly developing embryonic cells, control division, timing and rate of growth, and activity. "We have evidence that almost half the proteins synthesized during early embryonic development enter the nucleus. Some of these proteins must certainly regulate the flow of genetic information from nucleus to cytoplasm," says Dr. Kedes. Once normal

Any race of beings advanced enough to explore space would be socially advanced enough to live peacefully with earthlings, said Isaac Asimov, noted science fiction writer, to a Kresge Auditorium audience this spring. So there is less need to worry about the hazards of space exploration than to rejoice for its gains—hard vacuum for the taking, hard radiation in large quantities and low gravity.

cell activities such as this are understood, medical scientists may be able to apply the knowledge to understanding the loss of control which characterizes cancer cells.

Using normal sea urchin embryo cells in recent studies at M.I.T., Dr. Kedes has developed evidence of extra-nuclear control of ribonucleic acid activity. RNA is produced along the cell genes in the nucleus and migrates out of the nucleus into the cytoplasm, where it serves as a messenger to trigger the cellular production of various proteins.

Dr. Kedes has shown, however, that some specific messenger RNA's are active in protein synthesis only at selected times in the developmental schedule. The kinds of message are also changing throughout development. Many of these messages are specifically designed to regulate the production in the cytoplasm of special proteins which then enter the nucleus. The production of these proteins seems to be the major task of early embryonic development. The process of synthesis of these nuclear proteins appears to be well ordered and carefully timed so that the normal cell behaves in a steady and orderly way.

Dr. Kedes hopes to uncover the nature of the messages for nucleoprotein synthesis with the help of a salary grant of \$100,000, to be used over a period of five years, from the Leukemia Society of America. He is one of 20 L.S.A. Scholars, the only one to be named this year. He hopes that understanding normal cell growth and activity will lead scientists to an understanding of the causes of leukemia, which is characterized by excessive growth and abnormal activity in white blood cells.



... and on Earthbound Cell Research

Lunar research will pay off on earth, said Isaac Asimov, free-lance writer who is a member of the Boston University faculty, to a full house in Kresge Auditorium this spring, for such reasons as that "we may find the basis of a cure for cancer on the moon."

The biggest stumbling block in the search for a cure for cancer, the noted science and science fiction writer said, is understanding the complexity of the cell. If we could see life in its skeletal form, we might be able to find out what goes wrong in a healthy cell to change it into a cancerous one. Dr. Asimov predicted that primitive life forms found on the moon may give scientists these answers.

But Dr. Asimov did not limit himself to the earth benefits of moon exploration; the moon will be a base for exploration of the solar system, he said. Asteroids, hollowed out, will make neat little planets in which men can travel about the galaxy. And, he predicted, they will meet other, non-human explorers of space.

Dr. Asimov felt that any race of beings advanced enough to travel beyond their native planet would be advanced socially and fully capable of peaceful relations. Eventually, he said, there would be formed a true Galactic Empire.

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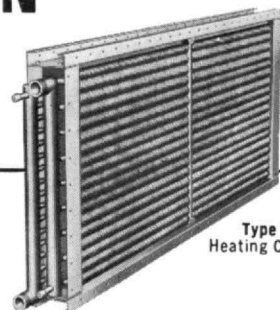
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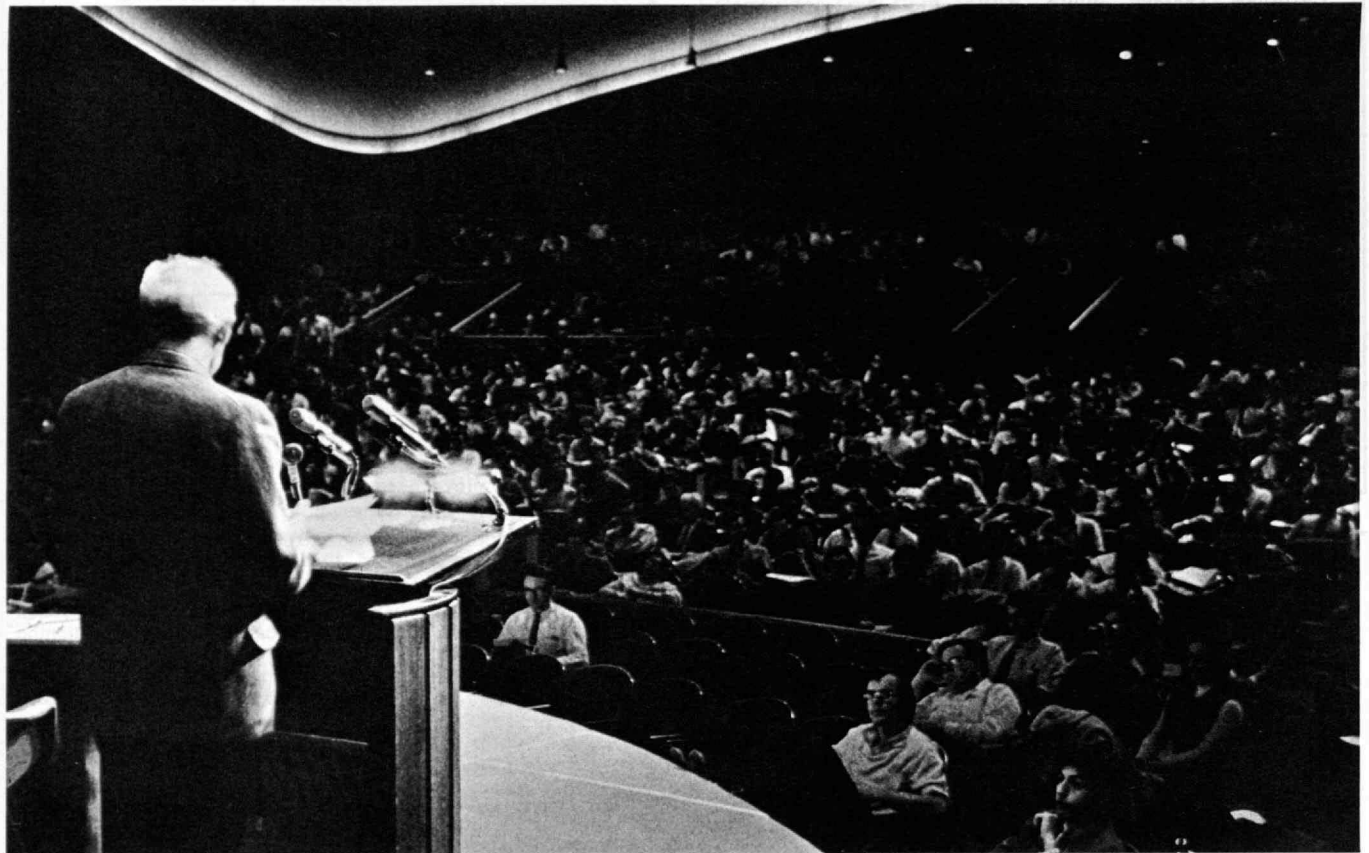
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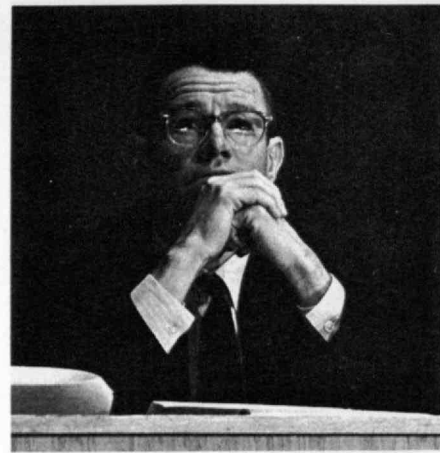


"Something has gone sour, in teaching and in learning. . . I think this whole generation of students is beset with a profound uneasiness. . . I think that what we are up against is a generation that is by no means sure that it has a future," said George Wald during the day of meetings held at M.I.T. on March 4 in Kresge Auditorium.

"Sweet Reason" on Science's Responsibilities

The widely misunderstood issue of a "research stoppage" was set aside at M.I.T. on March 4 by the overpowering force of discussions of how scientists can influence the uses to which their works are put. There was no "strike" against anyone—nor had one really been intended, as Dr. Herman Feshbach explained in last month's "Correspondence Review" (see *Technology Review for April*, page 101). On March 4, M.I.T. laboratories and classrooms were open for business as usual.

Plans for a day devoted to how "misuse of scientific and technical knowledge presents a major threat to the existence of mankind" and how scientists might work "towards a more responsible exploitation of scientific knowledge" were announced late in 1968 at M.I.T. by a group of prominent faculty, some of whom later joined to form the Union of Concerned Scientists, collaborating with a student group called the Science Action Coor-



dinating Committee. At their encouragement, similar discussion sessions were also organized on some 30 other college campuses. The "work stoppage" was conceived simply as a way to dramatize the issues by suggesting that their import transcended that of any work now underway in scientific laboratories.

In Cambridge the result, which stretched from March 4 into the previous evening and to the following Saturday, turned out to be far more than the exercise of a few frustrations. Both the *Boston Globe* and the *New Yorker* thought so well of the address by Nobel Laureate George Wald, Professor of Biology at Harvard, that they printed it in full; the *Globe* said it "may be the most important speech of our time." Said Dr. Wald, "Just after World War II a series of new and abnormal procedures came into American life. We regarded them at the time as temporary aberrations. We thought we would get back to normal American life. But . . . these young students . . . think these things are normal. They think we've always had a Pentagon, that we have always had a big army, and that we always had a draft.

"Our government, like most governments, is obsessed with death, with killing and being killed. We scientists, we opt for life."

Other key speakers included such figures as Nobel prize winner Hans Bethe, Professor of Theoretical Physics in the Nuclear Studies Laboratory at Cornell University, W. G. McMillan, Professor of Chemistry at the University of California, Gar Alperowitz, Co-Director of the Cambridge Institute for Policy Studies, and Victor F. Weisskopf, Head of the Physics Department at M.I.T. (see below), who spoke during the two evening meetings.

Francis Low, Karl Taylor Compton Professor of Physics at M.I.T., opened the U.C.S. meetings by listing a number of major problems that show the dangers of uncontrolled use of technology: the arms race, the population explosion, the overuse of finite natural resources. As scientists, he said, we can no longer confine ourselves to the search for truth; we cannot remain unconcerned about the misuse of technology. We must instead try to find out how scientists can actively work to improve the world in which we live.

During the morning panel discussions, there were various suggestions for how academic research could become less dependent on support from the Department of Defense and how it could concern itself with more "socially useful" projects. Ronald F. Probst, Professor of Mechanical Engineering at M.I.T., described in detail how the M.I.T. Fluid Mechanics Laboratory had converted in accordance with just these goals three years ago. From studies of heat transfer and high temperature plasma physics, the six professors and 20 graduate students had transferred their energies to relevant problems from other areas, such as the flow of infections from the bladder to the kidney, the opening and closing of the aorta of the heart, and the distribution of smoke from a smokestack (they found there was no real knowledge of the relation between height of the smokestack and extent of pollution on the

Should the scientist organize for political action? The talks offered different answers. Hans Bethe, left, thought he should; Rep. George E. Brown of California, center, thought that scientists understand only "sweet reason" and not Washington politics; and Thomas Schelling, right, Professor of Economics at Harvard, thought he should keep within the "system." (Photos pp. 68-71: Owen D. Franken, '69)



Eugene Rabinowitch, chemist and physicist, Editor of the Bulletin of Atomic Scientists and a founder of the Federation of American Scientists, spoke of the international scientific community's special mission to promote world peace.

ground, although urban industries had been building even-higher smokestacks in the interests of "cleanliness" for years).

Mario Grignetti of Bolt, Beranek and Newman, an industry representative, suggested that scientists establish a clearinghouse where individuals could learn which nonmilitary government offices were interested in further research in their fields. Or, he said, scientists should launch a "flood campaign" by sending proposals for research to these offices, such as the Department of Health, Education, and Welfare. Armed with heavy demands for research funds, Mr. Grignetti said, H.E.W. would be able to argue more successfully to Congress for a larger share of the budgetary pie.

And Leonard Gruenberg, Assistant Professor of Electrical Engineering at M.I.T. and a consultant at the Los Alamos Scientific Laboratories, spoke of an "internal reconversion" within the military. "If the military realizes that by reorienting their research they'll be less vulnerable to public criticism, I think very great changes will be made within the Department of Defense itself," he suggested.

But as the day wore on, illusions that the scientific community could easily organize itself around these issues and influence the course of events faded rapidly. As Congressman George E. Brown, Jr., of California noted, "Scientists very rarely have a comprehensive idea of how to relate to the political process. I'm not at all sure audiences such as this really know what they should be doing. Washington listens to power and not sweet reason." However, the California Democrat said he agreed with the group's aims and was working for transfer of research funds from military-related to peace-related projects as a member of the House of Representatives' Science and Astronautics Committee.

And David Dayton, Chairman of the Board of Directors of the Boston Industrial Mission, pointed out that a large number of scientists work on defense-related research because "that's where the action is."

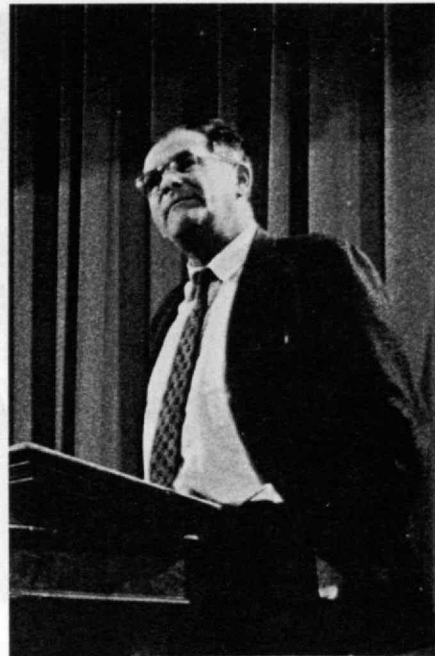
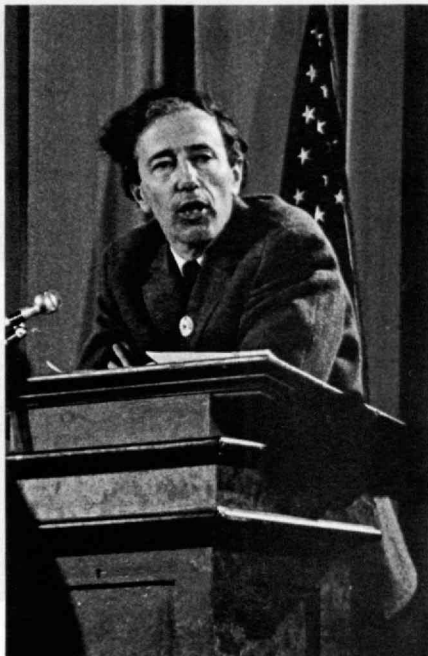
Finally, Saturday afternoon, U.C.S. held an open discussion of its plans and announced that it would continue as a group "in a concerted effort to influence public policy in areas where scientific knowledge and skill can play a significant role." The group intends to be national in membership and to be "particularly concerned with the problems of the arms race, pollution-induced climatic and ecological changes, and genetic manipulation."

Inevitability of the Present . . .

It is easy, from a position of ignorance, to accuse those in authority of being stupid, said William G. McMillan, Professor of Chemistry at the University of California (Los Angeles), speaking to the Union of Concerned Scientists at M.I.T. on March 4. But those who work in the Pentagon, charged with the defense of the United States, are not stupid; they are among the nation's most dedicated and responsible people, and they have a thankless task.

He reminded his audience that defense work could not proceed without experiments. For example, Dr. McMillan cited the importance of a defense advisory committee on which he (and Hans Bethe, another U.C.S. speaker) had recently served. The committee, he said, made the decision to carry out experiments which led to our present knowledge of the high-altitude radar blackout effect (to which previous speakers had referred as an obstacle to presently conceived antiballistic missile systems).

Youth, said Professor McMillan, has no monopoly on ideals. But ideals have to be focused on what is possible. And public response to military questions often lacks "fine structure". Turning to chemical and biological warfare for an example, Dr. McMillan emphasized the necessity to distinguish, in any



ethical discussion, between biological and chemical weapons—and to further distinguish between lethal and non-lethal chemical weapons. He quoted Mao advising his guerrilla fighters to swim in a sea of the people, and noted that non-lethal chemical weapons were necessary to “sort out” enemies who followed this advice and were surrounded by our friends.

The fact is, said Dr. McMillan, that “things are the way they are because it is exceedingly difficult to make them otherwise.”

Gar Alperowitz, Co-Director of the Cambridge Institute, left, described the historical role of the scientist during the development of the atomic bomb. Francis Low described the dangers and challenges to scientists in today's non-military technology, and Victor Weisskopf described two ways in which scientists could implement their concerns for the uses of their research.

... and the Need to Know More

If a scientist considers that some identifiable organization is misusing technology, he can act in one of two ways: he can choose the “inside” method or the “outside” method, said Victor F. Weisskopf, Head of the M.I.T. Department of Physics, at the opening session of the U.C.S. meetings.

If, that is, one is critical of present decisions by the Department of Defense, one may either go to work for the Department, where it is important to have good scientists to subject proposals to the most searching examination; or one may stay outside, organizing independent study groups, helping to educate the electorate, and—where technology is being applied in evil ways—protesting strongly and clearly.

Both ways are of value, although they cannot be attempted by the same man. But the “inside” and “outside” men actually tend to suspect one another, although in fact each needs the other, said Professor Weisskopf. Were it not for the concerned scientist on the outside, his colleague on the inside might be viewed as a radical! Other speakers, notably Hans Bethe on the following evening, reminded their audiences that it was the “inside” scientists who had brought the antiballistic missile question into the field of public debate.

To Professor Weisskopf, science is inseparable from optimism—the optimism that it is possible to enjoy the fruits of science without suffering for it. Where, as so often happens, the benefits of technology bring with them unforeseen ills, it is the responsibility of scientists to find out, by careful retrospective study, what went wrong. “From whatever point you look, it is good to know more.”



Herbert York, Professor of Physics at the University of California (left), and George Kistiakowski, Professor of Chemistry at Harvard who was Science Adviser to President Lyndon B. Johnson, joined James R. Killian Jr., testifying in Senate subcommittee hearings that the government could benefit from independent findings of a weapons technology policy review group. (Photo: Wally McNamee from Newsweek)

A.B.M. and Weapons Evaluation

In the public debate over deployment of the Sentinel missile system prior to President Richard M. Nixon's decision in March, two issues stood out: one was the question of the merits of the proposed Sentinel antiballistic missile system, the other was the question of public confidence in the military-executive decision making process.

Addressing himself to the latter issue, James R. Killian, Jr., Chairman of the M.I.T. Corporation and the first White House Science Adviser, proposed in testifying before the Senate Subcommittee on Internal Organization and Disarmament Affairs in March, that the U.S. needs to establish a new policy review group. We need a task force which could channel public debate on weapons issues by making an "independent, comprehensive study in depth of our weapons technology and of the factors which bear upon the decisions the nation must make," he said.

"Their special value would be that they would be independent conclusions reached by a group of competent citizens who were free of organizational loyalties. By virtue of this freedom such a commission could also provide some reassurance to the growing number of citizens who are concerned about the 'military-industrial complex' and its alleged influence."

Dr. Killian added that "it is important for the policymaker and the public to have the benefit of listening to contending points of view on complex technical and strategic proposals such as the Sentinel." However, he said that he was not proposing that the findings of such a commission carry more weight than studies conducted within the government.

James Reston, Executive Editor of the *New York Times*, lauded the Killian proposal as having "considerable merit." Two days later, President Richard M. Nixon included in his announcement plans for an annual review of it by his Foreign Intelligence Advisory Board, ("a non-partisan group of distinguished private citizens"). Robert B. Semple, Jr., of the *Times*, wrote afterwards, "at least a part of Dr. Killian's message crept into (Mr. Nixon's) final presentation."

While disqualifying himself of "any specialized competence on current proposals," Dr. Killian in his statement to the Senate Subcommittee reported that, in his view, A.B.M. deployment should be deferred. His long experience

with government and defense problems, Dr. Killian said, "has given me a growing awareness of the importance to national security of sustained efforts to seek a curtailment of the strategic arms race. My views toward the A.B.M. have been conditioned by the priority I give to moderating, if at all possible, an action-reaction escalation of the arms race."

In taking this view, Dr. Killian was joining what appeared to be the vast majority of the Cambridge scientific community. Jerome B. Wiesner, M.I.T. Provost who was Science Adviser to President John F. Kennedy, wrote last year that the A.B.M. system "produces a kind of electronic Maginot Line. The defender sits and guesses about his attacker's tactics. If he guesses that this is going to happen, he invents a technology to deal with it. If he guesses that something else is going to happen, he invents another technology. But perhaps something quite unexpected happens."

"I don't think the defender is ever to know what to expect," he said. "I am convinced that the variety of techniques available to a nation planning an offensive system is great enough to keep an anti-ballistic missile system of the kind we are talking about totally off-balance."

Jack P. Ruina, M.I.T. Vice President for Special Laboratories and formerly Director of the Advanced Research Projects Agency, testified to the Senate subcommittee on disarmament before the Nixon decision that he opposed the A.B.M. on technical grounds: an enemy, he said, might overpower the system with radar decoys. Dr. Ruina also told the subcommittee that the United States could afford to wait one or two years before making a decision on whether to defend its strategic bases.

George W. Rathjens, Visiting Professor of Political Science at M.I.T., formerly an adviser to the late President Dwight D. Eisenhower, opposed the A.B.M. because of the "softness" and "vulnerability" of its costly radar system. Thus, he said, echoing the objections of many in Cambridge, it could not fulfill its designed purpose to protect the U.S. strike-back capacity.

Saloma:

The Time Is Ripe for Ripon

A founder of the Ripon Society, John S. Saloma, III, Associate Professor of Political Science at M.I.T., has strong views about the science of Republican politics and the art of how to change them. And, with a new Republican Administration in Washington, the science may stay the same, but the art will be different.

As a past president of the Ripon Society, the self-appointed gadfly, research team, conscience, and lobbyist for liberal policies for the Republican party, Professor Saloma is now a self-appointed gadfly, conscience, and lobbyist for Ripon. And, in his view, the challenge—to both Ripon and Republicans—is great in 1969.

Since its foundation six years ago, Ripon has built chapters in major U.S. cities, enrolling mostly liberal Republicans and young businessmen; the Society has been mainly concerned with researching problems and formulating action on major national issues—the negative income tax and draft reform are examples—and it has published a monthly, the *Ripon Forum*.

"Until this year, Ripon's role in the party was fairly clear," explained executive board member Howard L. Reiter. "It was the one voice in the Republican intellectual wilderness. . . . But now that the party is in power, Ripon must undergo a transformation, and just what it will be is a matter of some concern to the membership."

"The events of the past year have shown that the Democrats are now in a state of what I call disintegration," says Professor Saloma. "The old coal-



John S. Saloma, III

tions of the thirties are breaking up. Moreover, since Nelson Rockefeller's defeat for the presidential nomination in Miami, the Republicans have an unstructured, unorganized moderate middle. If the Republican party is to become anything besides the plaything of the Goldwaters and the Reagans, Ripon must help it build a strong base to the left. Only then will the party get through the mid-seventies with any sort of balance."

Not only must Ripon build a political base, he told *Technology Review*, but it must formulate bridges—policies and positions—with which the old party can reach out to new groups: the uncommitted middle-class voter, the militant blacks, and, especially, the young generation. "There has been as yet no clear formulation of what it is to be a Republican in 1969," Professor Saloma said. "But, if the Ripon is to remain alive as a revolutionary idea, it should formulate a significant part of this statement."

Duncan Foley, an M.I.T. economist and columnist for the *Forum*, thinks that the Society should worry less about the party's goals and more about maximizing Ripon's unique talents. "What resources does Ripon have to build a political cadre? We don't have a great deal of money, nor a membership used to recruitment in the style of a wardheeler, nor great numbers of field workers. Political recruiting, I think, should be left to those Republicans who can do it best—the politicians themselves."

But Professor Foley asserts that Ripon has another unique resource in its remarkably good access to Cambridge academic institutions, and "this is a resource we can capitalize on to produce excellence." Ripon should aim, he said, to being the group which knows which problems are coming up and what to do about them.

Since President Richard M. Nixon drew on three key Ripon officials for junior White House posts (two are under Daniel P. Moynihan, Special Assistant for Urban Affairs, and one, Lee Huebner, is considered the "in-house liberal" on the Presidential speechwriting staff), other Riponites, including Ralph Earle, who was briefly Editor of the *Forum* and is now a doctoral student in political science at M.I.T., fear that Ripon may lose its gadfly independence if too many key officers keep feeding into the new Administration. "It is possible" says Professor Saloma, "that the Administration may use its Ripon contacts to try to get the Society to tone down its criticism."

But Professor Saloma says: "Nixon ought to realize that it is in his interest to keep us criticizing him from the left; a party looks more honest and believable if criticism comes from within. "After all," he added, the Democrats came through 1968 remarkably well."

The Stresses of Academe

One-quarter of the members of M.I.T.'s Class of 1965 visited the M.I.T. Psychiatric Service at least once during their four undergraduate years in Cambridge. Why did they come? What were the stressful situations in their personal and academic lives which most commonly led students to consult the Institute's medical department? Are there lessons in this research for all higher education?

Dr. Benson R. Snyder, M.I.T. Psychiatrist-in-Chief, and Dr. Merton J. Kahne of the M.I.T. Education Research Center have reported some answers in a recent issue of the *American Journal of Orthopsychiatry*:

On a demographic basis:

Students who consulted the Psychiatric Service were more likely to come from higher rather than lower socioeconomic levels.

Students using the service most often came from two-children families in

which there was a brother. ("This has led us to speculate," the psychiatrists wrote, "that male students who do not have sisters may have had intensely competitive experiences with their brothers that in later adolescence left them more vulnerable to complicated transference phenomena. . .") Students whose parents were divorced or separated before admission to M.I.T. were most likely to seek psychiatric help.

Dr. Snyder and Dr. Kahne said stress was also associated with certain events in a student's academic and social experience:

Different academic departments "presented their students with significantly different stresses at different points in time." For instance, the two psychiatrists said, the peak period of Psychiatric Service use by physics students came in their first term as majors in the field, while students in mathematics most often sought help in the first term of the senior year.

Members of some living groups came often, members of others seldom or never. The psychiatrists conclude that this "was related to shared notions in the living group about the 'causes' of such experiences as anxiety or depression and about the appropriateness of discussion or introspection" for their solution.

Students who switched living groups or major fields came more often than those who did not. And the timing of their visits was significant: "Students who consulted the Psychiatric Service prior to a move from one course to another were far more likely to remain at M.I.T. . . . than those who came in the term following the course move," say the psychiatrists in their report.

Dr. Snyder and Dr. Kahne ended their report with a warning: "Students develop a variety of strategies to deal with the almost inevitable dissonance between their past, their present, and their hoped-for future. . . . For example, students must learn to selectively neglect certain activities and to assign strict priorities to the subjects they study if they are to maximize their academic standing."

The psychiatrists wrote that they have begun to ask themselves: "Does the educational institution ask the student to limit seriously his adaptive potential in order to give him an A? . . . Can the student do well in school and still develop, for example, the ability to take informed intellectual risks?"

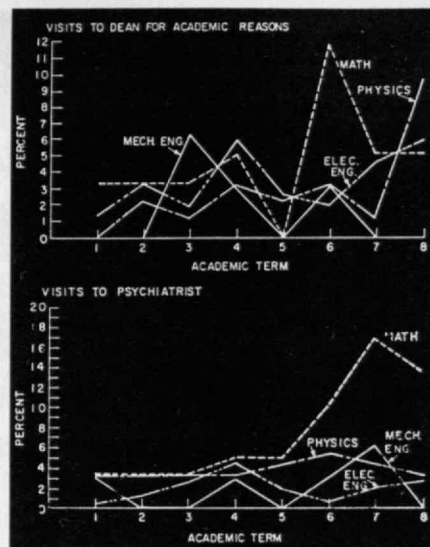
"It is precisely this kind of question," Dr. Snyder and Dr. Kahne wrote, that should challenge colleges and universities to consider the consequences of their curricula "for the development of excited, imaginative, and concerned students."

Housing Catalysis—A New Academic Collaboration

A major and perhaps unique effort to catalyze the construction of new urban housing and so help one of the nation's largest academic centers lift itself out of a serious housing shortage was announced at M.I.T. in April.

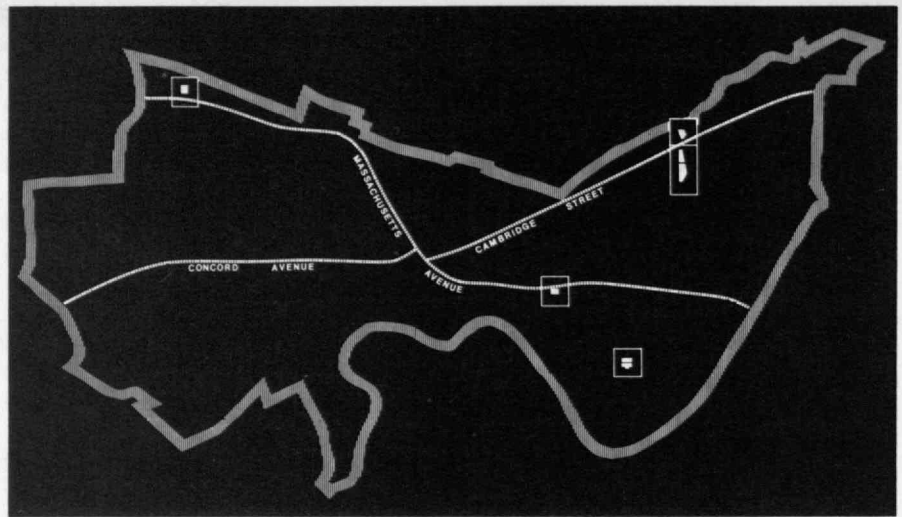
James R. Killian, Jr., Chairman of the M.I.T. Corporation, announced that the Institute has used its own resources to assemble five parcels of under-used land in Cambridge, and it is prepared to initiate and assist in the construction of 1600 new dwelling units on these sites, of which 750 units would be for low income families and the elderly, and 850 would be for local residents and M.I.T. personnel at the "lowest feasible market rents." The result would be a 5 per cent increase in Cambridge's total housing stock.

"The proposal," said Dr. Killian, "is the result of M.I.T.'s effort to find ways for an educational institution, without distorting its central academic function, to take initiatives in assisting the community in meeting critical housing



Cross tabulation of an M.I.T. class's use of helping resources with its academic career shows some surprising results. Evidently, different departmental programs produce significantly different patterns of stress in their students.

Five sites in Cambridge, all under-utilized industrial land, have been assembled by the Massachusetts Institute of Technology for housing projects, and the Institute is now actively working with neighborhood and city groups to develop plans. When fully utilized for low-income and other Cambridge residents the sites could yield a 5 per cent increase in the total housing stock of the city, where pressure from growing population and from college students has led to a serious housing crisis.



needs," he insisted, however, that M.I.T. offered "no ready-made or instant solutions."

M.I.T. has temporarily advanced over \$1 million to assemble the five parcels, Dr. Killian said. They are all underdeveloped industrial or commercial sites; much of the land is vacant. Although the sites are convenient to schools, churches, parks, playgrounds, transportation, and shopping facilities, they include only six residential buildings with eight tenants, whom M.I.T. will undertake to help relocate.

M.I.T. assured the city that it would help in the development of the program on a no-loss, no-gain basis. Dr. Killian insisted that the Institute "does not intend to be a landlord." He also promised that M.I.T. will support and initiate housing developments based on extensive interviews with local residents and consultations with community leaders, the Cambridge Housing Authority, and interested neighborhood groups. "A program of this kind," Dr. Killian said, "must involve the collaboration of the city and all its agencies, the neighborhood organizations, and the relevant federal and state agencies." Many diverse requirements must be met before the proposal can become a reality, he said. But he and Howard W. Johnson, President of M.I.T., emphasized that Cambridge has the talents and the resources to meet the present housing crisis.

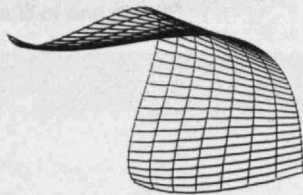


"We hope," they said, "that our proposal will receive the support it needs to succeed and hope further that it may stimulate additional efforts by agencies, organizations, and individuals in Cambridge to provide the decent standards of housing at reasonable cost that all our citizens deserve."

In the same announcement, M.I.T. said it would undertake to build new on-campus housing for 850 students to help reduce the pressure on Cambridge housing. It will also—as soon as they become vacant—make available to the Cambridge Housing Authority's Leased Housing Program up to 50 dwelling units in off-campus buildings which M.I.T. now owns or leases.

In his own announcement to the M.I.T. faculty of the housing program proposed for Cambridge, President Johnson said that he saw "great potential in this plan for the Institute to take some creative steps in housing, to provide technical assistance to others, and also to stimulate relevant agencies and groups in Cambridge to make further contributions to the housing supply. This program could come to represent, I believe, a new but altogether proper way for an educational institution to participate in seeking solutions to a significant urban problem."

The *Boston Globe* called the plan a "most worthwhile undertaking," and the *Boston Herald-Traveler* said it was "a specific example of how an educational institution can be a good citizen."



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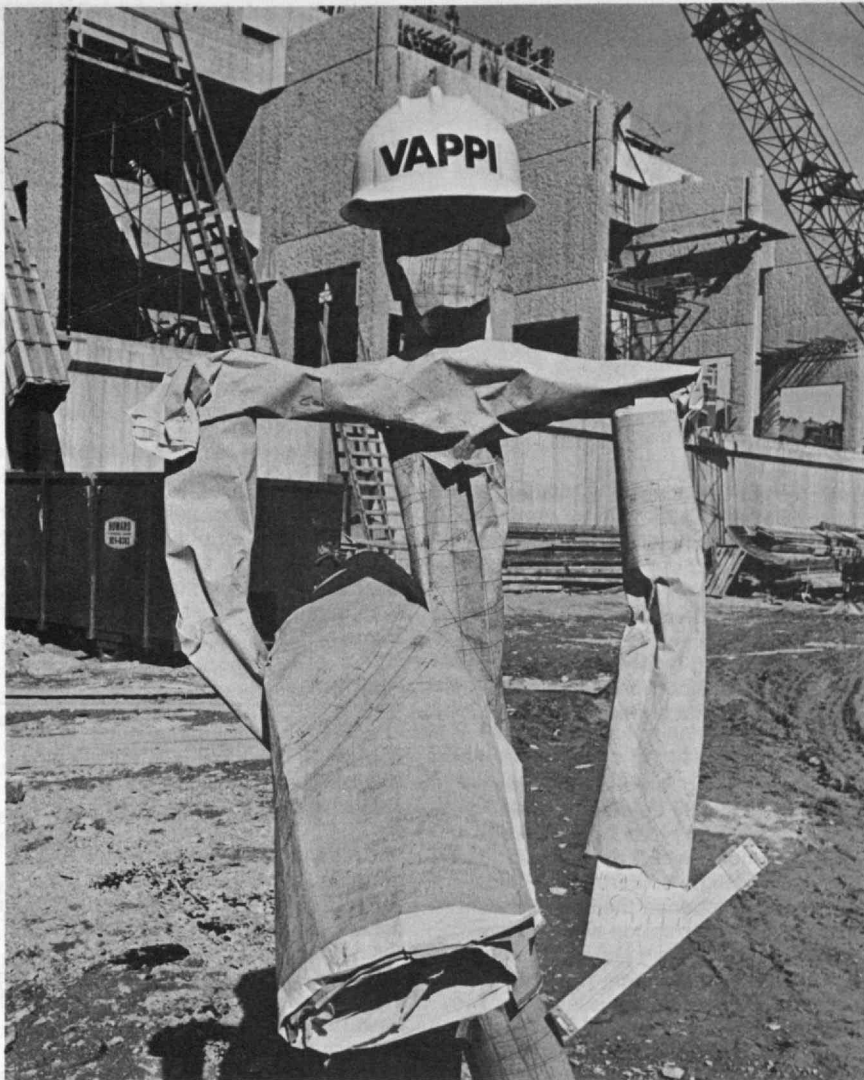
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Puzzle Corner

Allan J. Gottlieb

This summer I purchased a standard "Baker House" (M.I.T.) set of stereo components (A. R. turntable, Dyna amp. and preamp., etc.). What I forgot to realize was that I no longer would be living under standard Baker House conditions. I was so accustomed to having five electrical engineering types within earshot that I didn't consider the problems of maintaining such a stereo "system" on my own.

First came putting the mess together. Well, 6.01 is mostly differential equations and all math types can solve differential equations so I gave it a try. After purchasing a soldering iron and some solder, I opened the box and went to work. First interruption was an emergency visit to the drug store for some burn ointment. After some minor skin surgery, the beasts were assembled. The preamp. didn't work at all. Even the power light didn't go on. At Baker House I would merely ask John Forster, Bob Damis, or Pete Wolfe to help me out. At home I only had my differential equations book, which didn't help at all. After several frustrating hours I found that the line cord was defective.

The amp. worked wonderfully—for two weeks. Then the right channel began to sound awful. Dyna fixed that for a mere \$6.50. I could have griped since it was under warranty, but there was an "outside chance" that I soldered it badly. But who cares? I had 120 watts of distortion-free signal going to my cheap speaker from which random sounds erupted. I was really content and was planning to buy new speakers—until the disaster.

First, the only speaker I had in Boston started to sound funny. It turned out that cheap speakers cannot handle the bass from a good amp. O.K., who wants cheap speakers, anyway? When this one finally blew I brought up my other one and started pricing AR-3's. Then the right channel deteriorated again and was very sensitive to jiggling the input jack. Finally the whole system died.

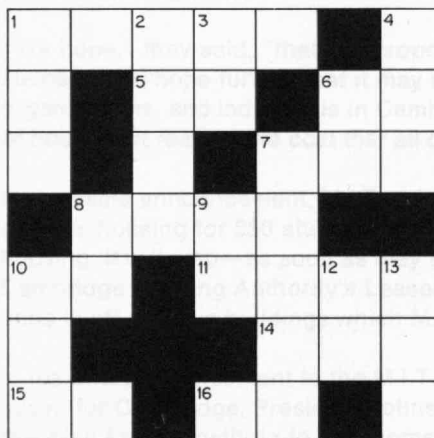
At least if it were tube equipment I could fry eggs on it. As it is, all my "system" does is sit. The only other Baker House resident around is my col-

league Randy Gabel, who knows little more than I do about electrical engineering. He owns a set of headphones which I had hoped to use as test equipment. But now he is afraid to let me even touch them . . . and I cannot really blame him.

Problems

The first problem for this month is from Thomas B. Jabine; it is a famous old English puzzle called Dog's Mead. Mr. Jabine writes:

31 "Although this puzzle relates to a farmer, his family, and his land, it involves a good deal of engineering mathematics and logic. The problem is to find the age of Mrs. Grooby, Farmer Dunk's mother-in-law, and you must not assume the puzzle was invented this year. You'll need to know that there are 20 English shillings to the pound sterling, that an acre is 4,840 square yards, and that a rod is a quarter of an acre. Also, these hints help: One number in the puzzle is the area of Dog's Mead in rods, but it relates to something in the puzzle quite different from that area.



Across

1. Area of Dog's Mead in square yards.
5. Age of Farmer Dunk's daughter, Martha.
6. The difference between the length and breadth of Dog's Mead in yards.
7. Number of rods in Dog's Mead times number nine down.
8. The year when Little Piggly came into occupation by the Dunk family.
10. Farmer Dunk's age.
11. The year Farmer Dunk's youngest child, Mary, was born.
14. Perimeter of Dog's Mead in yards.

15. The cube of Farmer Dunk's walking speed in miles per hour.
16. Number fifteen across minus number nine down.

Down

1. The value of Dog's Mead in shillings per acre.
2. The square of Mrs. Grooby's age.
3. The age of Mary.
4. The value of Dog's Mead in pounds sterling.
6. The age of Farmer Dunk's first-born, Edward, who will be twice as old as Mary next year.
7. The square, in yards, of the breadth of Dog's Mead.
8. The number of minutes Farmer Dunk needs to walk one and one-third times around Dog's Mead.
9. See number ten down.
10. Ten across times nine down.
12. One more than the sum of the digits in the second column down.
13. Length of tenure, in years, of Little Piggly by the Dunk family.

The next problem is from Frank Rubin:

32 Let p_1, p_2, \dots, p_n be points in the plane such that distance $(p_i, p_j) \leq 1$ for $1 \leq i \leq j \leq n$. Prove that these points lie within a circle of radius $1/3\sqrt{3}$.

Francis A. Packer, Jr., sends the next one:

33 Construct a triangle given the three altitudes.

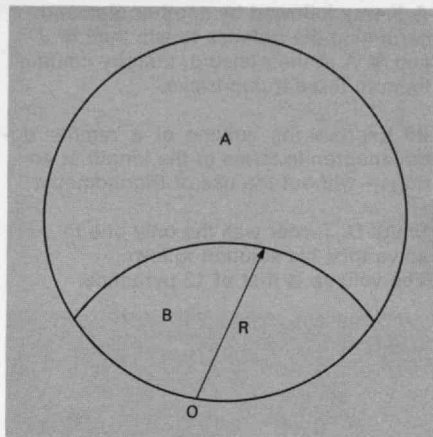
The following was contributed by Cornel Somogyi of the Association of American Railroads Research Center:

34 a and A are the surface areas, v and V the volumes of a smaller and a larger sphere, respectively. If $A = (a + 10)$ square inches and $V = (v + 10)$ cubic inches, what are the corresponding radii? Solve to two decimals!

H. Weber Hartmann had a dilemma. He writes: "I have had a simple problem harrasing me for quite some time and hesitated to ask anyone to solve it for me due to its ridiculousness. But upon reading the January, 1969, issue of *Technology Review* I came across the corrected solution of the grazing cow problem and decided mine wasn't too silly at that. So here goes:

35 "A cow is grazing in a circular field A of any given area, say 10 acres. She

is tied at O with a chain R long. How long must the chain be for her to cover an area B of one acre?"



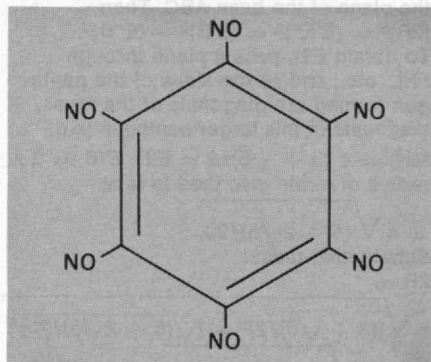
Speed Department

Tom Amaier submits the following: "I enjoyed seeing a 'chemical' problem in your Speed Department in February so decided to give you a few more. The one you gave requires a knowledge of chemistry ($\text{Fe}^{++} = \text{ferrous}$); but mine require even less knowledge of chemistry:

SD14 H I O Ag—a famous saying.

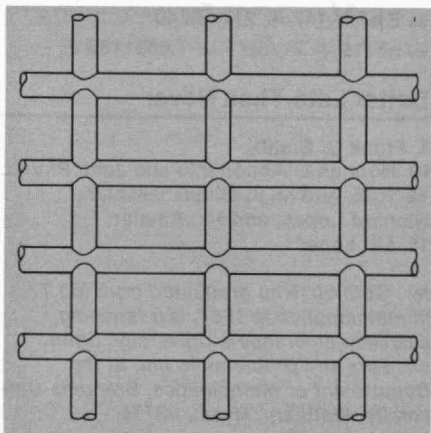
SD15 Ba (Na)₂—food.

SD16 A new drug

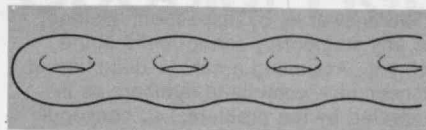


Solutions

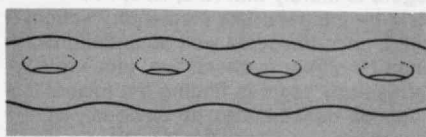
16 Consider the surface of an infinite jail cell, which extends up, down, left, and right:



And two infinite holed tori, one extending to the right:



... and one extending to the left and the right:



Are any two of these three homeomorphic? Why, or why not?

No one solved this problem, so here's a hint: the jail cell and the double infinite torus are homeomorphic but the single infinite torus is different.

17 If an animal is tethered to one side of a circular silo in an open field by a rope with length equal to the circumference of the silo and can graze over an area of one acre, what is the outer diameter of that silo?

The following solution is from Karl E. Schoenherr:

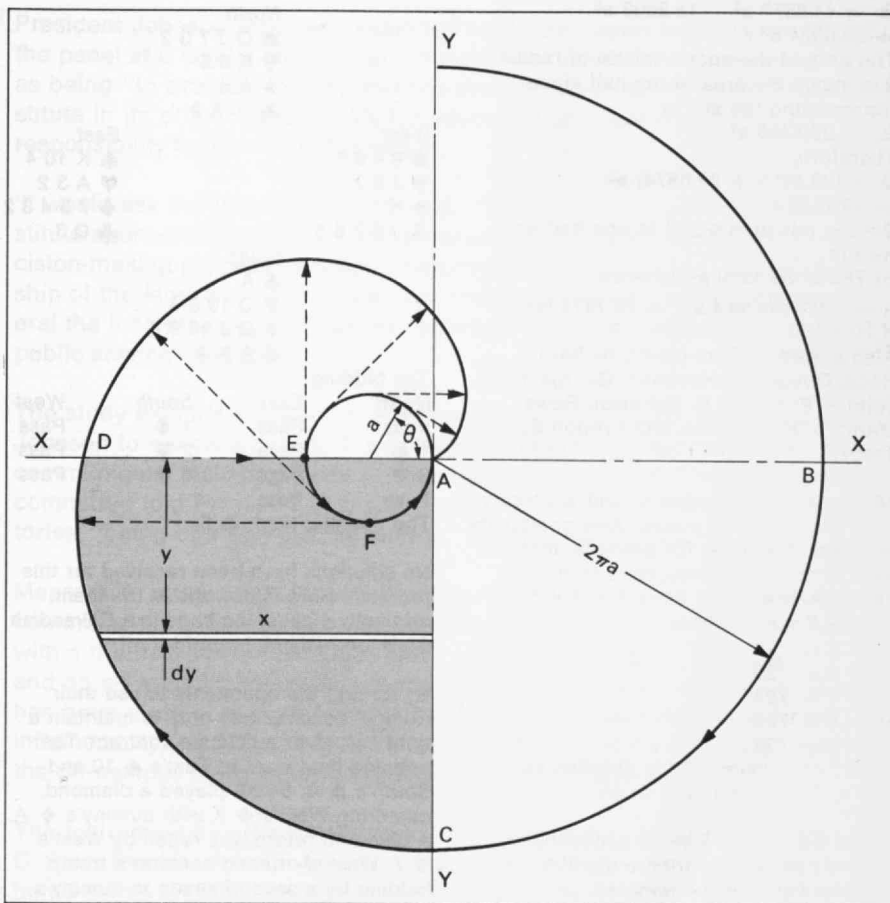
Referring to the sketch, let a be the unknown radius of the silo and A be the point at which the rope tethering the animal is attached. The length of the rope is then $2\pi a$. Construct an X — Y

system of coordinates with the origin at A , and draw the involute of the circle representing the silo as shown in the figure.

Assume that the animal starts to graze at A and proceeds to B along the X axis; then, holding the rope tight it proceeds along the circular arc from B to C and then along the arc of the involute from C to D . From there the animal proceeds along the X axis to E and around the circumference of the silo back to A . The area enclosed by these boundaries is one half of the maximum grazing area reachable by the animal, and therefore is to be one-half acre by hypothesis. If this area is denoted by G , we have

$$G = \frac{1}{4} (2\pi a)^2 \pi - \frac{1}{2} (a^2 \pi) + \int_0^{2\pi a} x \, dy \quad (1)$$

where the integral is the area shown



shaded in the drawing. The parametric equations of the involute of the circle with respect to the chosen coordinate system are

$$x = a(\cos \theta + \theta \sin \theta) - a \quad (2)$$

$$y = a(\sin \theta - \theta \cos \theta) \quad (3)$$

where θ is the angle between the radius vector a and the positive direction of the X axis, as shown. Differentiating (3), we get

$$dy = a \sin \theta d\theta. \quad (4)$$

Therefore, the area under the involute arc is

$$G_1 = \int_0^{2\pi a} x dy =$$

$$a^2 \int_{\alpha}^{\beta} (\cos \theta + \theta \sin \theta - 1) \theta \sin \theta d\theta$$

$$= a^2 \left[\int_{\alpha}^{\beta} \theta \sin \theta \cos \theta d\theta + \int_{\alpha}^{\beta} \theta^2 \sin^2 \theta d\theta - \int_{\alpha}^{\beta} \theta \sin \theta d\theta \right]$$

$$= I_1 + I_2 + I_3 \quad (5)$$

The limits β and α have the following values:

$$\beta = 2\pi \quad (6)$$

$\alpha = 1.4274\pi$ for which $y = 0$. Evaluating the integrals, we get

$$I_1 = \frac{1}{2} \left[\frac{1}{4} (\sin 2\theta) - \frac{1}{2} (\theta \cos 2\theta) \right]_{\alpha}^{\beta} \quad (7)$$

$$I_2 = \frac{1}{4} [\theta \sin (2\theta \sin \theta - 2\theta^2 \cos \theta) + 2/3 (\theta^3) - \theta - 1/2 (\sin 2\theta)]_{\alpha}^{\beta} \quad (8)$$

$$I_3 = [\sin \theta - \theta \cos \theta]_{\alpha}^{\beta} \quad (9)$$

Therefore,

$$G_1 = a^2 \left[\frac{1}{4} (\sin 2\theta) - \frac{1}{4} (\cos 2\theta) - \sin \theta + \theta \cos \theta + \frac{1}{4} [\theta \sin (2\theta \sin \theta - 2\theta^2 \cos \theta) + 2/3 (\theta^3) - \theta - 1/2 (\sin 2\theta)] + 1/6 (\theta^3) - \theta/4 \right]_{\alpha}^{\beta} \quad (10)$$

Introducing the limits from (6), we have

$$G_1 = a^2 [44.8977 - 15.2003] = 29.6974 a^2.$$

The area of the quarter circle of radius $2\pi a$ minus the area of the half circle representing the silo is

$$G_c = 29.4355 a^2.$$

Therefore,

$$G = (29.4355 + 29.6974) a^2 = 59.1329 a^2.$$

Setting this area equal to one-half acre, we get

$$21,780 = 59.1329 a^2, \text{ whence}$$

$$a = \sqrt{21780/59.1329} = 19.1918 \text{ feet.}$$

Also solved by Tom Maier, Richard T. Roca, Douglas J. Hoylman, George Todd, John E. Prussing, R. Robinson Rowe, Mark Yu, K. B. Blake, and Lyndon S. Tracy.

18 It is always possible to find arbitrarily long sequences of consecutive composite numbers. Suppose, for example, that we wish to find five consecutive composite numbers. We define $6! = 1 \cdot 2 \cdot 3 \cdot 4 \cdot 5 \cdot 6 = 720$. Then numbers

$$6! + 2 = 722$$

$$6! + 3 = 723$$

$$6! + 4 = 724$$

$$6! + 5 = 725$$

$$6! + 6 = 726$$

are all composite; 722 is divisible by 2, 723 by 3, 724 by 4, and so on.

Is this the first time in the sequence of natural numbers that there are five consecutive composite numbers?

Captain John Woolston, U.S.N., submits the following:

"The answer is, by inspection, 'Hell no!' as any elementary school child could tell you. Assuming a narrow definition of consecutive composite numbers as illustrated by the problem, i.e., consecutive numbers divisible by consecutive integers, the requirement for $(N+2)/2$, $(N+3)/3$, ... $(N+M)/M$ to be integers is merely that $N/2$, $N/3$, ... N/M be integers. The elementary school child, unconfused as well as unenlightened by higher mathematics, faces this in his early years in finding the lowest common denominator, so obviously 5! meets the test (since $2 \times 3 = 6$). So also does $3 \times 4 \times 5$ or $5!/2!$, i.e., 120 and 60. So also any integer multiple of 60 meets the test.

"Of course, the use of 12 and 60 as number bases in mathematics is rather old. Babylonians among others probably used them for just this reason, since I doubt if the Babylonians were terribly bothered by polydactylism. Of course, in the broader definition of consecutive numbers, i.e., not prime, the first series of five is the series 24, 25, 26, 27, 28; but here I must lean on individual checking rather than on neat mathematic solutions to find the distribution of primes and the length of the gaps between them."

Also solved by Lyndon S. Tracy, James Shearer, G. J. Todd, Ernest W. Thiele, Tom Amaier, and Messrs. Rowe, Prussing, and Hoylman.

19 Neither side vulnerable:

North

♠ Q J 7 3 2

♥ K 6 5

♦ A 6

♣ 10 8 2

East

♠ K 10 4

♥ A 3 2

♦ 7 5 4 3 2

♣ Q 3

South

♠ A

♥ Q 10 8 4

♦ Q J 10 9 8

♣ A K 4

The bidding:

North	East	South	West
Pass	Pass	1 ♦	Pass
1 ♠	Pass	2 ♥	Pass
3 ♥	Pass	4 ♥	Pass
Pass	Pass		

The opening lead: ♠ 5.

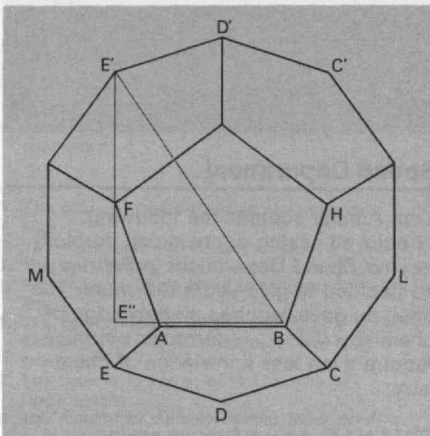
No solutions have been received for this problem. Here is how the M.I.T. team, originally playing the hand in a Cavendish Club tournament, brought it off:

By forcing the opponents to use their trumps, declarer was able to maintain a tight hold over a delicate contract. The opening lead went to East's ♠ 10 and South's ♠ A. South played a diamond, capturing West's ♦ K with dummy's ♦ A. A diamond return was ruffed by West's ♥ 7. West shortened declarer's trump holding by a second spade to dummy's

♠ J and East's ♠ K. Another diamond was ruffed by the ♥ 9 and overruffed by the ♥ K. The SQ permitted the declarer to discard a club. A club to the ♣ A and ♣ K was followed by another diamond, permitting the defense to win their ♥ J and ♥ A at their leisure, thereby limiting them to three trump tricks.

20 Express the volume of a regular dodecahedron in terms of the length of an edge—without the use of trigonometry.

Smith D. Turner was the only one to solve this; his solution follows:
The volume is that of 12 pyramids:



Thus the volume is $12 \times 1/3 \times \text{area of one face} \times \text{radius of the inscribed sphere (R)}$. The last term is difficult. On the sketch, let E'' be the projection of E' on the plane of the base ABC. Then $(2R)^2 = (E'E'')^2 = (E'B)^2 - (E''B)^2$. To obtain $E'B$, pass a plane through FHL, etc., and as the sides of the pentagon formed are diagonals of the faces, diagonals of this larger pentagon (e.g., MH) = $e(3 + \sqrt{5})/2 = E'B$. $E''B = 2 \times \text{radius of circle inscribed in face}$

$$= e \sqrt{(5 + 2\sqrt{5})/20}.$$

Substituting these:

$$2R =$$

$$e \sqrt{[(3 + \sqrt{5})/2]^2 - [(5 + 2\sqrt{5})/20]^2}$$

$$R = e \sqrt{(25 + 11\sqrt{5})/40}.$$

$$\text{So } V = 12 \times 1/3 \times 5/2$$

$$\left(e^2 \sqrt{(5 + 2\sqrt{5})/20} \right)^3$$

$$\times e \sqrt{(25 + 11\sqrt{5})/40}$$

$$= 5 e^3 \sqrt{(47 + 21\sqrt{5})/40}$$

$$= e^3 (15 + 7\sqrt{5})/4 = 7.6631189 e^3$$

Better Late Than Never

1 Frank G. Smith.

10 Norman L. Appollonio and John P. Vint.

12 R. E. and M. K. Bhananaskhian, Richard Lopes, and Mr. Amaier.

15 Mr. Lopes.

Mr. Gottlieb, who graduated from M.I.T. in mathematics in 1967, is a teaching assistant at Brandeis University. Send answers and problems to him at the Department of Mathematics, Brandeis University, Waltham, Mass., 02154.

Special Report

M.I.T. in the Public Service: What Place Defense?

Continuing concern for the responsibility and freedom of academic research and a growing feeling against war which finds voice throughout the U.S. today have conjoined to bring about a major new study of M.I.T.'s relation to defense research through its Instrumentation and Lincoln Laboratories.

A special review panel appointed by Howard W. Johnson, President of M.I.T., is now at work, and its speed and thoroughness have left the campus breathless and almost unbelieving. Its 22 members are devoting essentially full time to their assigned task of "a full assessment of the laboratories' relationship to M.I.T." The panel is pledged to report by October 1 and to make a preliminary report by May 31; its Chairman is William F. Pounds, Dean of M.I.T.'s Sloan School of Management.

President Johnson received "extended applause" upon his announcement of the panel at a faculty meeting late in April. He described its assignment as being "to evaluate the implications that the laboratories have for the Institute in its prime responsibility for education and research and in its responsibility for service to the nation.

"I would ask the panel," he continued, "to review the appropriateness for Institute sponsorship of the current programs at the laboratories, the decision-making process by which new programs are accepted, the relationship of the laboratories to on-campus research and education, and in general the long-standing policies and procedures of the Institute with respect to public service obligations."

The study extends the work of a committee appointed last fall by President Johnson to review all of M.I.T.'s outside memberships, sponsorships, and commitments, including those of the special laboratories. This spring the committee told President Johnson that the issues concerning the laboratories, "being of a very special nature," justified special study.

Meanwhile, attacks by students and faculty opposed to the Institute's broad commitments to defense-sponsored research and especially against work within the Instrumentation Laboratory on missile guidance equipment and an all-weather helicopter navigation system stirred the campus. There has been a plethora of statements (many exaggerated, uninformed and inflammatory), and late in April there were efforts (mostly abortive) to picket the off-campus Instrumentation Laboratory headquarters.

The Instrumentation Laboratory was organized before World War II by C. Stark Draper, then Professor of Aeronautical Engineering, to work on bomb sights and military navigation problems. Since then it has been in the forefront of guidance, navigation, and control technology, working under



M.I.T.'s debate on its proper role in military research takes many forms and involves all parts of the community. But there is continuing determination to use "rational and orderly means to reach decisions on what is the right thing for this community," James R. Killian, Jr., Chairman of the M.I.T. Corporation, told members of the Alumni Advisory Council late in April. "We have had no use of force, obstruction, and lawlessness at M.I.T., and we shall accept none," Howard W. Johnson, President, wrote to the alumni early in May.

At an open meeting of the Faculty and Administrative Councils late in April, Mason Haire, Professor of Management (left, above), insisted that hair-splitting and power politics are inappropriate. "We should ask as simply as we can, 'Along what kinds of lines do we want to shape the future?'" he said.

Earlier, C. Stark Draper, Director of the Instrumentation Laboratory, described the Laboratory's work at a noon rally on the steps of the main M.I.T. buildings, and later (right) Victor F. Weisskopf, Head of the Department of Physics, expressed to a crowded faculty meeting his concern to preserve the freedom of inquiry which he called a tradition of the American university.

sponsorship of the Department of Defense and N.A.S.A. (the Apollo program).

Lincoln Laboratory was created 18 years ago to study problems of continental air defense in the nuclear age. It is almost totally supported by the Department of Defense, with major programs in space communications, re-entry measurements, radar technology, solid-state research, and other areas of applied electronics.

"Issues That Have To Be Looked At"

Community feeling runs deep on the issues before the panel.

In order not to prejudice the panel's work, President Johnson and James R. Killian, Jr., Chairman of the Corporation, announced that no new classified research programs will be accepted by the Instrumentation or Lincoln Laboratories during the course of the study. Current programs will continue unaffected, they said.

Protesters maintained vigorously that there should be a moratorium on the missile guidance and helicopter navigation studies in the Instrumentation Laboratory. President Johnson categorically refused, insisting that a moratorium would be prejudicial.

Both the affected laboratories were well represented at the faculty meeting at which the study panel was announced, and speakers called attention to the laboratories' achievements and to their need for continuing inputs from the M.I.T. academic community.

Summarizing campus events in the *New York Times*, Robert Reinhold noted that "M.I.T. has been cooperating closely with the Defense Department in developing new military technology since World War II, when radar was developed at the Institute." The two affected laboratories, he said, receive major government research contracts for "some of the most sophisticated



and important research on guidance systems for ballistic missiles and satellites and on radar technology."

Mr. Reinhold found members of the M.I.T. faculty unanimous in supporting the mission of the panel. "They are raising issues that have to be looked at, no question," said Jack P. Ruina, Vice President. But Mr. Reinhold said that few faculty were ready to support the strong statements of the dissenters, among them the demand that M.I.T. "end its symbiotic relationship with the Defense Department. We must fight to reduce the power of the defense establishment."

The members of the panel, in addition to Dean Pounds, are: Robert L. Bishop, Dean of the School of Humanities and Social Science; Philip N. Bowditch, Associate Director of the Instrumentation Laboratory; Noam A. Chomsky, Ward Professor of Linguistics; Gerald P. Dinneen, Assistant Director of Lincoln Laboratory; Peter Elias, Professor of Electrical Engineering; Edwin R. Gilliland, Warren K. Lewis Professor of Chemical Engineering; Peter R. Gray, a member of the Alumni Advisory Council; David G. Hoag, Associate Director of Instrumentation Laboratory; Jonathan P. Kabat, a graduate student in the Department of Biology; George N. Katsiaficas, a third-year undergraduate student in the Sloan School of Management; Irwin L. Lebow, Group Leader at Lincoln Laboratory; Jerome B. Lerman, a graduate student and Research Assistant in Electrical Engineering; Elting E. Morison, Professor of History and American Studies at Yale University; Frank Press, Head of the Department of Earth and Planetary Sciences; Marvin A. Sirbu, Jr., a graduate student in the Department of Electrical Engineering; Eugene B. Skolnikoff, Professor of Political Science; Gregory Smith, Alumni Term Member of the M.I.T. Corporation and Chairman of the Editorial Advisory Board to *Technology Review*; Julius A. Stratton, Chairman of the Ford Foundation and President Emeritus of M.I.T.; Wallace E. Vander Velde, Professor of Aeronautics and Astronautics; Victor F. Weisskopf, Head of the Department of Physics; and Richard J. Wurtman, Associate Professor of Endocrinology and Metabolism.

The dissidents, most members of the so-called Science Action Coordinating Committee (S.A.C.C.), originally insisted that the review panel should include representatives from outside the M.I.T. community, and they proposed such names as Gerard Piel, Publisher of *Scientific American*, and Senator William Proxmire of Wisconsin. But Dr. Killian responded that "it is the duty and obligation of a great university to make its own decisions about itself."

The Changing Mood on Campus Research

Is the history of defense-sponsored research in colleges and universities now entering a new phase?

James R. Killian, Jr., Chairman of the M.I.T. Corporation, told William K. Stevens of the *New York Times* early in May that he believes so. "There is now a shift in interest," Dr. Killian is quoted in the *Times*. "There was a period when the cutting edge of technology was in the areas of the military and space. But there is a feeling now that in terms of national need we ought to devote a larger proportion of work to other fields." There is a steady growth in faculty interest in such areas as urban problems, bioengineering, and transportation, and Dr. Killian believes "we are moving toward a new balance in research."

World War II propelled science and engineering into the forefront of national affairs by demonstrating their vast military significance, and M.I.T. into the forefront of science and engineering through its own demonstration of power in these fields. At the end of the war Vannevar Bush (M.I.T.'16), who was Director of the Office of Scientific Research and Development in World War II, wrote that "no small part of modern strength depends upon the wisdom with which science is furthered and utilized."

Since then, writes Mr. Stevens in the *Times*, a partnership of federal, industrial, and academic activity "has been the main instrument of scientific inquiry and technological advance in the U.S." He traces three successive "mutations"—the post-World-War-II demilitarization in which the federal research effort was spread to include the National Science Foundation, the National Institutes of Health, and many other non-military agencies; the onset of the cold war; the start of the space age, with a major effort suddenly assigned to N.A.S.A.; and now "a rising tide of antimilitary feeling among university researchers."

The legacy of O.S.R.D.—"the basis of the country's scientific and technological effort," writes Mr. Stevens—is "the government contract as the main mechanism for financing private research."

Of all colleges and universities, M.I.T. is probably the third largest user of federal funds for research; the Institute's total was \$168 million for campus academic research and for work at Instrumentation and Lincoln Laboratories in 1968.

Classified research has always had a qualified welcome at M.I.T. Karl T. Compton, the Institute's ninth President, told alumni in his annual Alumni Day report in 1948 that research results "must be free for publication for the benefit of all, except under a very few special circumstances dictated by national security."

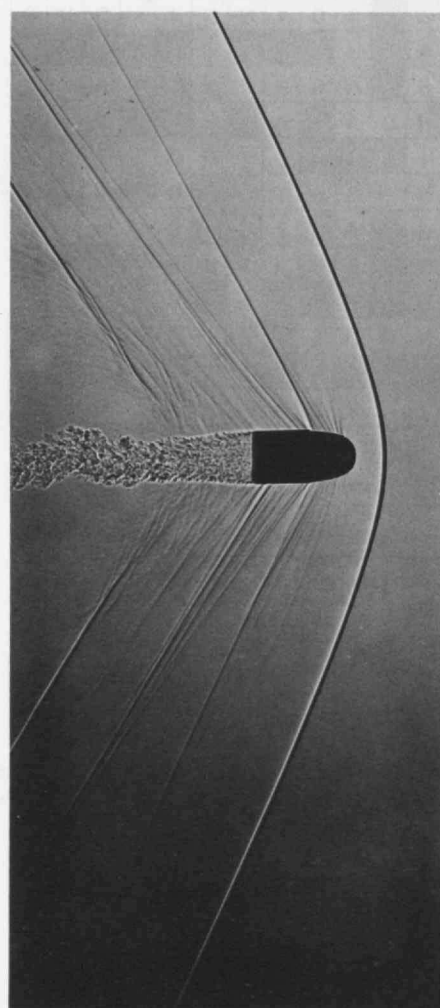
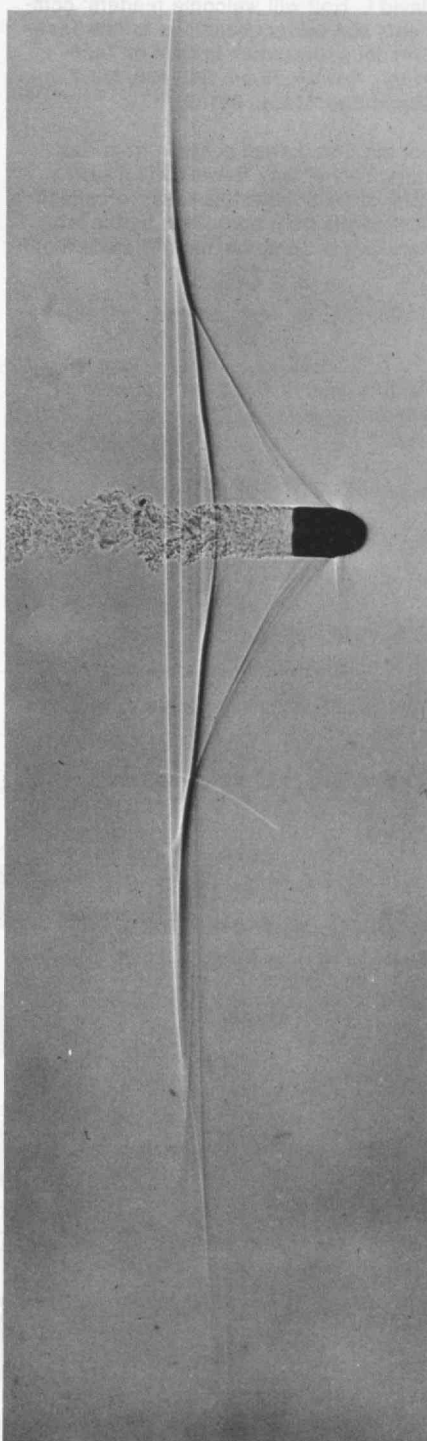
Today, essentially all the classified research which is in progress at M.I.T. is concentrated in the Instrumentation and Lincoln Laboratories, and it is important to note that only parts of their total programs are classified.

Strobe Probe

Harold E. Edgerton

At the right, a 22-cal. "long" rifle bullet traveling at a velocity exceeding the velocity of sound in air is photographed in silhouette to show its shock waves. Note that waves have a "dark" and a "light" side. At the left, a 22-cal. "short" with a velocity of less than the velocity of sound is shown with its sound waves. Note that the waves at the stern appear as "light" lines with no "dark" phase, and that some are almost straight. Why?

Readers are invited to comment.



Harold E. Edgerton is Emeritus Institute Professor and Emeritus Professor of Electrical Measurements in the M.I.T. Department of Electrical Engineering. He is widely known for contributions to high speed photography, most of which are chronicled in *Flash*, coauthored by Professor Edgerton and James R. Killian Jr., Chairman of the M.I.T. Corporation.



The correct solution to John M. Sandor's Technological Crossword, published in *Technology Review* for April, is shown above.

For the first correct solution from each state, *Technology Review* will award a copy of "A Scientist Speaks," a collection of excerpts from addresses by the late Karl Taylor Compton, ninth President of M.I.T.

A. English physicist, 1818-1889.

B. $PV=RT$ (3 words).

C. Silverlike alloy.

D. Arctic Cetacean, the male of which is tusked.

E. Pertaining to or containing tin.

F. Christian manual of the 2nd century.

G. Trivalent metallic element.

H. Pertaining to the death of tissue.

I. Control flap.

J. (Comp.) A transport process.

K. Ascribed; arraigned.

L. Cattleherder.

M. The bottomless pit.

101	190	146	10	59			
134	110	45	5	161	179	63	30
	169	52	156	37	126	77	
19	165	50	115	35	196		
4	142	27	85	163	124	75	
84	138	23	97	181	60	111	65
55	7	152	80	73	185	123	
114	42	162	116	194	127	17	
154	188	78	143	168	56	34	103
131	112	15	87	174	182	22	
6	96	199	135	76	149	68	54
	118						26
175	18	41	160	66	186	92	
189	57	33	100	145	3		
166	14	95	193	170	106	61	

N. Northern European country.

129 155 71 141 21 93

O. Larceny.

178 139 16 107 197

P. Korean reservoir and town, just north of the 38th parallel.

79 167 9 39 122 99 195

Q. Rubbed out, erased.

49 137 64 128 38 91 2

R. The West.

191 24 148 144 44 164 81 173

S. Choice, rare; sought after.

12 140 25 36 102 151 125 86 62

T. (Comp.) A relation of a terminal and a neutral point of an armature.

20 11 119 94 40 109 184 69 47

132

U. A death; funeral, memorial service.

150 159 72 89

V. Receptacle for holy water.

183 180 88 104

W. American mathematician and physicist.

48 153 176 58 70

X. Science of the equilibrium of gaseous fluids and of solid bodies immersed in them.

29 117 192 136 187 120 53 121 82

8 172

Y. A compound with sugar; a carbohydrate; an ester of sugar.

158 74 31 83 90 1 113 171 98

198

Z. Any spirit distilled from wine (3 words).

51 67 177 28 43 130 108 157

Z₁. Writer of children's books.

147 32 133 105 46

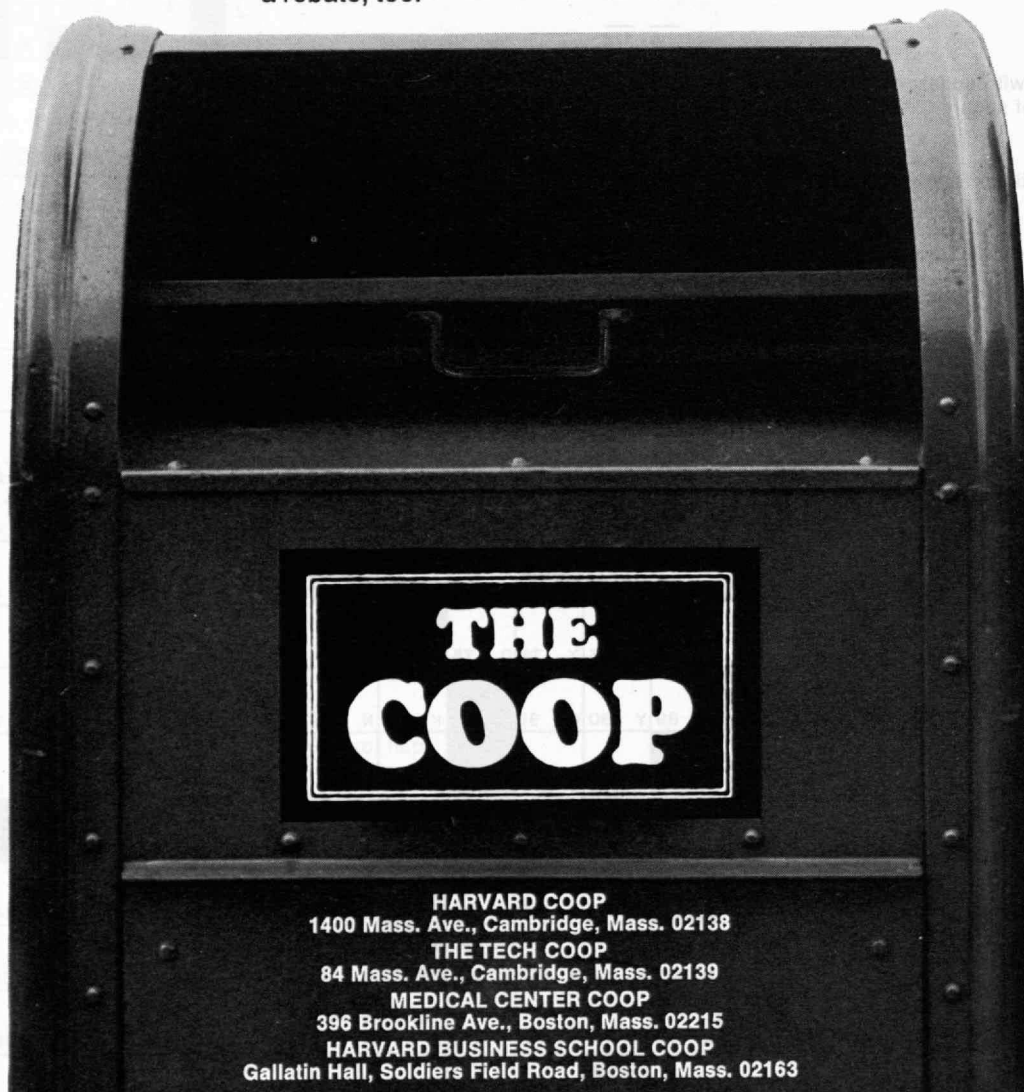
-	Y	I		Q	2	L	3	D	4	B	5	J	6	F	7	X	8	P	9	A	10		T	11	S	12	B	13	M	14	I	15	O	16	G	17			
		K	18	C	19	T	20			N	21	I	22		E	23	R	24	S	25	J	26	D	27	Z	28	X	29	B	30	Y	31	Z ₁	32		L	33		
H	34	C	35	S	36			B	37	Q	38	P	39	T	40	K	41	G	42	Z	43	R	44		B	45	Z ₁	46	T	47	W	48	Q	49		C	50		
Z	51			B	52	X	53	J	54	F	55			H	56	L	57			W	58	A	59		E	60	M	61	S	62			B	63	Q	64			
E	65	K	66	Z	67	J	68	T	69	W	70	N	71	U	72	F	73	Y	74	D	75		J	76	B	77	H	78	P	79	F	80	R	81	X	82	Y	83	
E	84			D	85	S	86	I	87	V	88			U	89	Y	90	Q	91			K	92	N	93	T	94	M	95			J	96	E	97	Y	98		
P	99	L	100	A	101	S	102	H	103	V	104	Z ₁	105		M	106	O	107			Z	108	T	109	B	110	E	111	I	112	Y	113	G	114			C	115	
G	116	X	117			J	118	T	119	X	120			X	121	P	122	F	123			D	124	S	125	B	126	G	127	Q	128	N	129			Z	130	I	131
T	132	Z ₁	133	B	134	J	135			X	136	Q	137		E	138	O	139	S	140			N	141	D	142	H	143	R	144	L	145	A	146	Z ₁	147			
R	148	J	149	U	150	S	151	F	152	W	153	H	154	N	155	B	156	Z	157	Y	158			U	159	K	160	B	161			G	162	D	163	R	164		
C	165	M	166	P	167			H	168	B	169			M	170	Y	171	X	172	R	173	I	174	K	175	W	176	Z	177	O	178	B	179	V	180	E	181		
I	182	V	183			T	184	F	185	K	186	X	187	H	188			L	189	A	190	R	191	X	192	M	193	G	194	P	195	C	196	O	197	Y	198	J	199

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A record on-campus housing program is an element of the Institute's response to a housing crisis in Cambridge

The Warren K. Lewis Professorship goes to one of his former students at a nostalgic Corporation luncheon

A first report on the "pass-fail" experiment: it is passing

A new student president, and a new student government

Summer programs in systems design

A faculty committee reports on M.I.T.'s placement programs

The Corporation approves a new Advisory Committee on Institute-Wide Affairs

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Institute Review

A Record Housing Program To Help Solve an Urban Crisis

An \$18-million on-campus housing program, the largest such effort ever undertaken by M.I.T. was announced early in April as an integral part of the Institute's plan to help relieve the housing shortage in the city of Cambridge (see page 75). Elements in the program include:

1. A new undergraduate house to accommodate 325 students adjacent to MacGregor House, now under construction.
2. A second tower in Westgate, the apartment complex for graduate student families, at the west end of the campus, to house 400 single graduate students.
3. Remodeling of Burton-Conner House, on Memorial Drive, to relieve overcrowding and to eliminate fire hazards.
4. Conversion of two existing small un-

dergraduate dormitories on Massachusetts Avenue—Bexley Hall and Random Hall—for use by 230 single graduate students.

Through this program, and with the completion of MacGregor House in September, 1970, according to Howard W. Johnson, President of M.I.T., there will be an increase in housing on the campus for about 230 undergraduates and for 630 single graduate students. In all, new or improved housing on the campus will be available for over 1,600 students. And since enrollment is not expected to increase, the program will benefit Cambridge by reducing the number of students on the city's housing market, President Johnson said. He emphasized that the program was coordinated with the Institute's plan to help add to the housing supply in Cambridge.

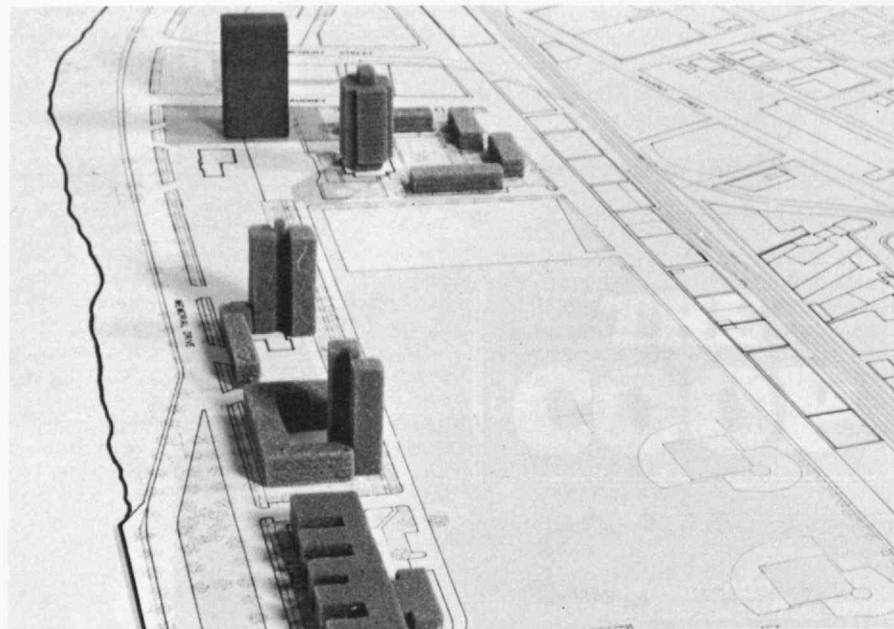
Plans for developing undergraduate housing have been modified to include the graduate student projects, according

to Lawrence H. Bishoff, '59, Director of Housing and Dining Services. The development of a center for graduate students is now separate from the residential program. Instead of a single residential complex for graduate students, M.I.T. now proposes a "series of housing solutions" related to the campus. These will eventually include additional accommodations for single and married students at the east end of the campus as well as the west end. The ultimate goal—by 1980—is to house on the campus up to 50 per cent of all graduate students.

The \$18 million program will require a commitment of more than \$12 million in M.I.T. funds; these will be supplemented by funds borrowed either under federal or state programs or privately. The work will proceed as rapidly as funds become available, with construction on the Westgate tower for graduate students scheduled to start within a year if a pending federal loan application is approved. Remodeling of Burton-Conner will begin upon completion of MacGregor House, so Burton-Conner occupants displaced by the work can move to the new building.

Westgate II, the new tower structure at the west end of the campus, will be developed initially as apartments for single graduate students; each apartment will contain several small bedrooms grouped around one lounge and kitchen to make a residential unit. But the plans will permit these to convert later into apartments for married students, with fewer but larger bedrooms associated with each living room and kitchen, should needs change in future years. Hugh Stubbins and Associates, Inc., of Cambridge, architects, are now working on final drawings. The building will also include "modest" community facilities—laundry, social rooms, an apartment for a faculty family, and service areas.

Meanwhile, Mr. Bishoff reported, discussions are under way with student residents and the architect, Marvin E. Goody, '51, to develop final plans for the extensive refurbishing of Burton-Conner. Present estimates are that the result will reduce the number of students in those two houses by nearly 200 (from the 540 who now live there); work may begin as early as June, 1970.



This model of the West Campus area reveals two new housing units included in the Institute's new \$15-million program announced in April: Westgate II, a tall tower residence for single graduate students (and perhaps later for conversion

for married students) at the far end of the campus and a new undergraduate house to the east (toward the camera) along Memorial Drive. MacGregor House is the third unit in the west-to east line.



A Former Lewis Student Becomes the Lewis Professor

The first Warren K. Lewis ('05) Professor of Chemical Engineering was announced early in March: he is Edwin R. Gilliland, Sc.D.'33, who was a graduate student under Dr. Lewis at M.I.T. in 1932-33. The announcement of the Professorship and of its first tenant came at a luncheon of the M.I.T. Corporation in honor of Dr. Lewis on March 7.

Funding of the Lewis Professorship set a new record for M.I.T.—at the time of the announcement it stood at \$630,000 and was still rising. James R. Killian, Jr., '26, Chairman of the Corporation, called it "an extraordinary tribute" from more than 800 individuals, companies, and foundations.

"The father of modern chemical engineering" has been at M.I.T. almost since his graduation over 60 years ago. Although he became Emeritus Professor in 1948, he is still, at 85, active as a consultant to industry and an adviser to students and faculty.

At the luncheon in the Sala de Puerto Rico, where the announcement was made, Dr. Lewis was described as "one of the greatest teachers of our time." His aim has been not merely to teach chemical engineering but to remove the "blindness" that so often narrow the vision of the engineering specialist. In a very brief speech at the luncheon, Dr. Lewis said that the opportunities in science—pure and applied—for serving humanity are now greater than ever before. The future will present greater problems in the handling of human relationships in industry, he said, and science—particularly engineering—has contributions to make. They will be "contributions of idealism," said Dr. Lewis.

The movement to establish the Lewis Chair was headed by Crawford H. Greenewalt, '22, another of Dr. Lewis' former students. Mr. Greenewalt has served as President of E. I. du Pont de Nemours and Company, where he is now Director and Chairman of the Finance Committee. Mr. Greenewalt has been a Life Member of the M.I.T. Corporation since 1951.



Chemical Engineering Head

Raymond F. Baddour, Sc.D.'51, has been named Head of the M.I.T. Department of Chemical Engineering to succeed Professor Edwin R. Gilliland, Sc.D.'33, recently chosen as Warren K. Lewis Professor of Chemical Engineering (see above).

Professor Baddour received the B.S. degree from the University of Notre Dame in 1945 before coming to Cambridge for S.M. ('48) and Sc.D. degrees from M.I.T. He joined the M.I.T. staff to serve as Assistant Director of the Engineering Practice School at Oak Ridge in 1948-49, and he has been Professor of Chemical Engineering since 1963.

Internationally known for his work in the use of new techniques to develop improved chemical processes, Professor Baddour has made significant contributions in the application of chemistry and physics in the mechanism of heterogeneous catalysis, the application of plasmas to chemical reaction, the process of ion exchange, and the fundamental principles of the flow of molecules adsorbed on surfaces. His work on mass transfer in packed beds led to the more effective operation of large scale chromatographic separation plants.



R. F. Baddour



E. R. Gilliland

Warren K. Lewis, Professor of Chemical Engineering, Emeritus, was surrounded by friends in Cambridge on March 7. The M.I.T. Corporation and several hundred other guests met for luncheon in his honor; Crawford H. Greenewalt, '22, a grateful former student, presided (left); and Edwin R. Gilliland, Sc.D.'33 (below), who did his thesis under Professor Lewis, became the first Warren K. Lewis Professor of Chemical Engineering.

John W. M. Bunker, 1886-1969

John W. M. Bunker, a distinguished bacteriologist who served for 12 years as Dean of the M.I.T. Graduate School, died on March 21 following a long illness.

Dr. Bunker studied at Brown University and came to the M.I.T. Department of Biology and Public Health in 1921 after work in the field of industrial bacteriology. He was Director of the Research Laboratories of Biology from 1936 to 1940, when he became Dean of the Graduate School, and in 1937 he organized a new teaching program in biophysics and biological engineering which represented a pioneering effort to bring together engineering and life science disciplines in a single curriculum at the Institute.

Following his retirement in 1940, Dean Bunker served as Special Assistant to the President of M.I.T. for five years, and during this period he was in charge of the Institute's Registry of Guests, acting as official host to many international visitors to Cambridge. He received Brown University's honorary degree of Doctor of Science in 1949.

Dean A. Fales, 1890-1969

A distinguished career in automotive engineering was ended on March 5 with the death of Dean A. Fales, '14, in Kennebunkport, Maine. He was a member of the M.I.T. faculty in mechanical engineering for most of 40 years, between 1916 and 1956, and for much of this period he headed the Institute's work in automotive engineering.

Professor Fales was also active in the American Automobile Association, the Society of Automotive Engineers, and the Veteran Motor Car Club, and he served as a consultant to the automobile industry as well as to federal and state governments.

Pass-Fail at Mid-Term

"Although it is still too early to make conclusive statements, there has been a definite lessening of pressure on this year's freshmen due to the pass-fail grading system."



The Undergraduate Association Constitution specifies that the President must be registered as an undergraduate. But, as of election day, Michael A. Albert, '69, winner of the 1969 elections, was not. Later, it developed that he had paid his tuition and was attending classes; he simply had failed to pick up his roll cards—the official act of registration—and he said he fully intended to do so before the official deadline, which had not expired at the time of his election. (Photo: Owen D. Franken, '69)

This is the judgment of Gian-Carlo Rota, Chairman of the Freshman Advisory Council and Professor of Mathematics, who has completed a faculty report on the pass-fail system now being tried by this year's M.I.T. freshman class. Under the system, students receive "pass" or "fail" ratings at the end of each term instead of grades.

Professor Rota's conclusion: "This is good. This is how pass-fail is supposed to work. After all, a freshman needs time to look around and get used to his environment." Professor Rota said that during the first term of pass-fail, the freshmen worked just as hard and were just as competitive with each other as were previous freshmen classes during the first term. "So far there have been far fewer changes than anyone expected," he said.

However, Professor Rota fully expects changes in the way freshmen attack their studies in the second term of freshman year—and especially in their sophomore year, when they will receive A's and B's for the first time at M.I.T. A possible long-term effect of the pass-fail system, he believes, will be a "beefing up" of the Freshman Advisory program with an improvement in the number and quality of freshman advisers. "Pass-fail," he says, "requires much maturity and thought on the part of the student. And we should help."

The People's Choice

In a community where people are expected to compile and correlate substantial evidence before presenting plans and proposals, Michael A. Albert, '69, the new Undergraduate Association President, stands out. The platform on which he won as a write-in candidate included 11 major proposals and a proliferation of other suggestions for improving the students' lot at M.I.T. And within days of his election he had distributed an unprecedented quantity of handout material, defended and debated his ideas at the open March faculty meeting, and appointed a "surprised" freshman as his vice president.

Mr. Albert, a physics major, ran on a platform which included embracing the

grievances of blacks and poor whites, action on Cambridge housing, substituting "recommendations" for graduation requirements in M.I.T. curricula, improving the advisory system at M.I.T., and various forms of participatory politics, backed up with a firm statement that "reforms which seem outrageous today will seem commonplace five years from now."

But there is another side too. "No one has been more irrepressible than Mike Albert in defending students' interests and addressing himself to issues . . ." declared *The Tech* in endorsing his candidacy. And, the editorial continued, "he has demonstrated the interest and determination to do the sort of research which is necessary if a proposal for change is to be well defended."

"I realize," said Mr. Albert in his platform, "that there is nothing gained by any procedure that does not include the adoption of our programs by large numbers of people."

Farewell to Inscomm

When Michael A. Albert, '69 (see above), moved into his office as President of the Undergraduate Association, he also became head of a new student government designed to involve at least five times as many students as its predecessor.

After lengthy discussions and proposals throughout the fall and winter (see *Technology Review* for January, p. 72), students voted in a spring referendum to end the 20-year-old Institute Committee. In its place is the new "Undergraduate Constitution for a Unified University," named H.A.C. after its three authors, Peter Q. Harris, '69, Carson E. Agnew, '70, and Steven C. Carhart, '70.

The new legislative body is a General Assembly of 76 students, representing fraternities, dormitories, and off-campus residents. An "agenda" committee, also

headed by the U.A.P., and composed of students, faculty, and administration, organizes the topics for discussion by H.A.C.'s General Assembly.

The U.A.P. has on his staff a Vice President and a Secretary General—the latter a kind of public information specialist for the student administration, who will receive written reports from student observers at faculty committee meetings and who will be the official information-disseminator.

International Business

Two members of the Sloan School of Management will participate late this summer on the faculty of an INSEAD (European Institute of Business Administration) two-week seminar on "The Managerial Challenge of International Business." Peter P. Gil, Associate Dean for Executive Programs, and Mason Haire, Professor of Organizational Psychology and Management, will teach at Fontainebleau, France, from August 24 to September 5.

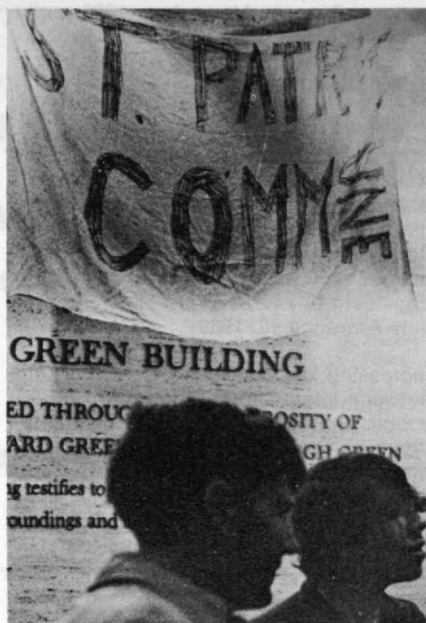
Parietals Decentralized

Under a new plan approved by the Executive Committee of the M.I.T. Corporation late last winter, the authority for determining parietal rules and hours in M.I.T. dormitory and fraternity houses has been delegated to the houses themselves.

The decision, announced by Kenneth R. Wadleigh, '43, Dean of Student Affairs, in March, leaves individual living groups in charge of determining their own visiting hours and conditions—and then enforcing their decisions. But the Executive Committee made it clear that "M.I.T. retains the authority to rescind this policy should our experience with it be unsatisfactory."

In recommending the change to the Corporation, Dean Wadleigh noted that "we traditionally rely upon upperclass student leadership to serve as models and as counselors for the younger students . . . and to police and judge most of the behavioral problems posed by their peers." Heretofore, he said, parietals were one of the few exceptions to this

"The St. Patrick's Day Commune," a group of now-you-see-them-now-you-don't campus humorists, spent that greatest of Boston holidays encamped in the lobby of M.I.T.'s Green Building to petition in behalf of the "plight of the Irish." (Photo: George J. Flynn, '69, from The Tech)



"decentralized" policy. With this responsibility also in the hands of students, Dean Wadleigh told the Executive Committee, "I believe we will be in a far better position to establish a relationship in which such questions as ethics, morality and taste can be addressed more openly and constructively."

Following the Executive Committee's vote, student leaders in each house began implementing elaborate plans to develop new rules and procedures, which will be reported to Dean Wadleigh's office upon adoption. Each house is pledged to review its rules annually and to provide for change by referendum in the interim periods.

A Great Day for the Irish

The following is reprinted in its entirety from The Tech for March 21, 1969:

M.I.T.'s first building take-over took place on St. Patrick's Day as the "St. Patrick's Commune" made camp in the lobby of the Green Building.

The "Commune," a group of about eight students and one dog, decorated the west lobby with green and white signs informing passers-by that the building had been "liberated." The take-over occurred around 9 p.m.

Dean Solomon, '72, a spokesman for the Commune, said that "the campus must be made aware of the plight of the Irish."

He said the Commune demanded that the Institute admit 100 Irish students each year.

The protesters, most of whom had painted their noses green, passed the evening imbibing a green beverage of undetermined contents. "Green beer," they said.

Mmmmm, Good

The Class of 1971 has changed the breakfast habits of many an Institute resident during the past two years, and they have made money doing it.

Each class entering the Institute must devise some way to raise funds, which chiefly go to supporting its elaborate junior prom and to leaving a parting gift for the Institute when it graduates. Most classes generate money from inside their own ranks, but '71 saw an opportunity to build a wider base and accordingly opened its highly profitable doughnut concession in the Building 10 Lobby. For those of us who don't eat breakfast, it was an immediate sensation; expanding waistlines on others attest to the universal appeal of fresh doughnuts. Disappointment is widespread among the staff

during school vacations when the goodies are not available.

In an experiment, '71 tried running the concession mostly on the honor system last summer, and it was relatively successful. Profits fell off some but never disappeared altogether, proving that M.I.T. is basically a (rather) honorable place. Now with the '71 Junior Prom coming up next fall, the class would like to persuade another to take over. Unless '72 or the incoming '73 agree, we may all go hungry again.—Tech Talk

Summer Systems Design Programs

Three special study programs in the field of systems design will be conducted at M.I.T. under the auspices of the Center for Advanced Engineering Study during the summer of 1969:

Engineering Systems Analysis, covering computer-aided analysis techniques for identifying, defining, selecting, and evaluating engineering designs will be presented by the Department of Civil Engineering from June 16 to 27.

Analysis and Simulation of Chemical Processes, concentrating on the use of modern systems analysis techniques to evaluate and optimize the design, operation and control of chemical processing plants, will be presented by the Department of Chemical Engineering from August 4 to 22.



Sticky fingers and expanding waistlines for many of the Institute community—and swelling coffers for the Class of 1971—have resulted from the daily sale of doughnuts in the lobby of Building 10. The Class having made its budget for next fall's Junior Prom, the concession is now up for grabs.

Digital Systems, and integrated treatment of theoretical and practical aspects with primary emphasis on the design and construction of moderately complex systems, will be presented by the Department of Electrical Engineering from August 4 to 29.

Further information is available from the Center for Advanced Engineering Study at Room 9-257, M.I.T.

Counseling and Placement

A student-faculty committee, reviewing in detail placement activities at M.I.T., has concluded that the Institute has "a responsibility to serve students in both career counseling and placement" and has recommended that activities in these fields be continued and strengthened.

The committee, reporting to the faculty this spring, said it "concurs with current policies" of the M.I.T. Placement Office in providing "interview opportunities impartially to all *bona fide* employers—industrial, academic, and government, including the armed services."

But it recommended especially that the career guidance programs in each department be strengthened. The committee asked deans and department heads to "take seriously this Institute responsibility to make available to our students sound and effective career guidance" by appointing placement officers and student-faculty committees, and asked the M.I.T. administration, in turn, to designate an officer who could coordinate and aid the departments in this work.

William P. Bundy to M.I.T.

William P. Bundy, formerly Assistant Secretary of State for Far Eastern Affairs, will join the staff of the M.I.T. Center for International Studies late this spring. The Vietnam expert—often credited as an "architect" of present U.S. Southeast Asian policy—will hold the dual title of Research Associate in the Center for International Studies and Visiting Professor of Political Science, according to Jerome B. Weisner, Provost. Mr. Bundy's appointment will be for at least a year and may or may not include teaching, according to his own choice.

Mr. Bundy will be associated with the Center's research program on Southeast Asia. He intends, said Lawrence E. Klein, '72, in *The Tech*, "to carefully study the development of the present situation in Southeast Asia—and then to make some projections as to the direction events in this region will take in the future."

Mr. Bundy graduated from Yale in 1939, received the M.A. from Harvard in 1940 and the L.L.B. in 1947. Before his appointment as Assistant Secretary of State in 1964 he was Deputy Assistant Secretary of Defense for International Security Affairs from 1961 to 1963 and then Assistant Secretary of Defense for Inter-

national Security Affairs from 1963 until 1964. He is a fellow of the Yale Corporation and a member of the Harvard Law School Association.

Civil Engineering Materials

A workshop in civil engineering materials, planned for faculty members in civil engineering at other educational institutions, will be offered at M.I.T. by Frederick J. McGarry, '50, Professor of Civil Engineering, and several colleagues from July 7 through 18, 1969.

Increasing knowledge of the relationships between internal structure and macroscopic properties of structural materials improves the engineer's use of these materials and makes it possible for him to design new materials for specific applications, according to Professor McGarry. The workshop is planned to demonstrate these new principles and to introduce the teaching methods which have been developed for this material in the M.I.T. Department's Materials Research Laboratory; a National Science Foundation grant will help meet its expenses.

Pot Luck Pleasures

The Pot Luck Coffeehouse, organized last term as a gathering place for folk music buffs in the Mezzanine Lounge of the Student Center on Friday nights, is now experimenting with a greater variety of talent and entertainment.

Folk music is still the main attraction. On Friday nights for the past few months, audiences in an informal candlelit atmosphere have heard performances by numerous student folksingers, notably Mickey Freeman, '70, who made his second appearance recently before a standing-room only audience.

To change the pace last month, the Wellesley Blue Notes appeared. The girls, decidedly not folksingers, appeared wearing formal dresses and singing sophisticated popular songs—including their original arrangement of the soul standard "Sunny." Between sets, old "Dracula" and "Our Gang" silent movies were shown. Spectators who had gone to the Coffeehouse expecting folk music were surprised but certainly not disappointed.

Usually it's anybody's guess as to what sort of entertainment will be presented. A student blues band has expressed interest in playing, and other groups or individuals who wish to perform are encouraged to do so. Everything at the Coffeehouse is free—entertainment, coffee, cider and doughnuts—but contributions are welcome.—*Tech Talk*

Joint Corporation Committee

A new special committee of the M.I.T. Corporation, authorized at its March meeting, will "associate with the Corporation a broadly representative group at the Institute to which the Corporation can

turn for consideration and advice on special Institute-wide matters." Its appointment represents the first time in its history that the Corporation has provided such a formal channel of communication to the Institute's academic community.

In announcing the new special committee—to be known as the Corporation Joint Advisory Committee on Institute-Wide Affairs—James R. Killian, Jr., '26, Chairman, said the Corporation "hopes that the committee will provide an additional means for bringing representatives of the student body, both graduate and undergraduate, and of the faculty into regular communication with the Corporation on matters not normally handled by the faculty and which are of long-range importance to the entire Institute community." As examples, Dr. Killian cited long-range campus planning, improvement of the institutional environment, and M.I.T. relations with Cambridge and Metropolitan Boston.

In considering these questions, said Dr. Killian, the committee will make available "information, views, and advice resulting especially from discussion and interaction among students, faculty members, and Corporation members meeting together."

Howard W. Johnson, President of M.I.T., in reporting the Corporation's action to members of the faculty, called the committee "a great opportunity for a continuing relationship between the Corporation and other members of the community."

Members of the new committee are to be six members of the Corporation, including the President of the Alumni Association and "at least one with special interests and background relating to the Boston and Cambridge communities;" six members of the faculty nominated by the faculty, including the Chairman of the Faculty; and six students, including the presidents of undergraduate and graduate student government and two additional undergraduate and two graduate students nominated "by elective process."

Individuals Noteworthy

To J. Earl Frazier, '24, President of Frazier-Simplex, Inc., and President-Elect of the American Ceramic Society, the Dr. Albert Victor Bleining Memorial Award of the Pittsburgh Section of the American Ceramic Society . . . to William Wilson Wurster '17, Dean Emeritus of the College of Architecture of the University of California, the American Institute of Architects gold medal for 1969.

To Harold E. Edgerton, Sc.D.'31, the National Geographic Society's John Oliver La Gorce Medal "for contributions to science and exploration through invention and development of electronic photographic and geophysical equipment." . . . To Athelstan F. Spilhaus, S.M.'33, the William Procter Prize of the Scientific Research Society of America.

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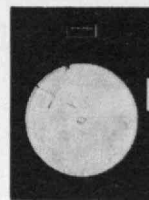
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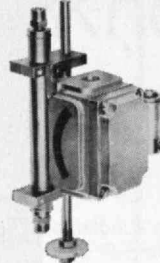
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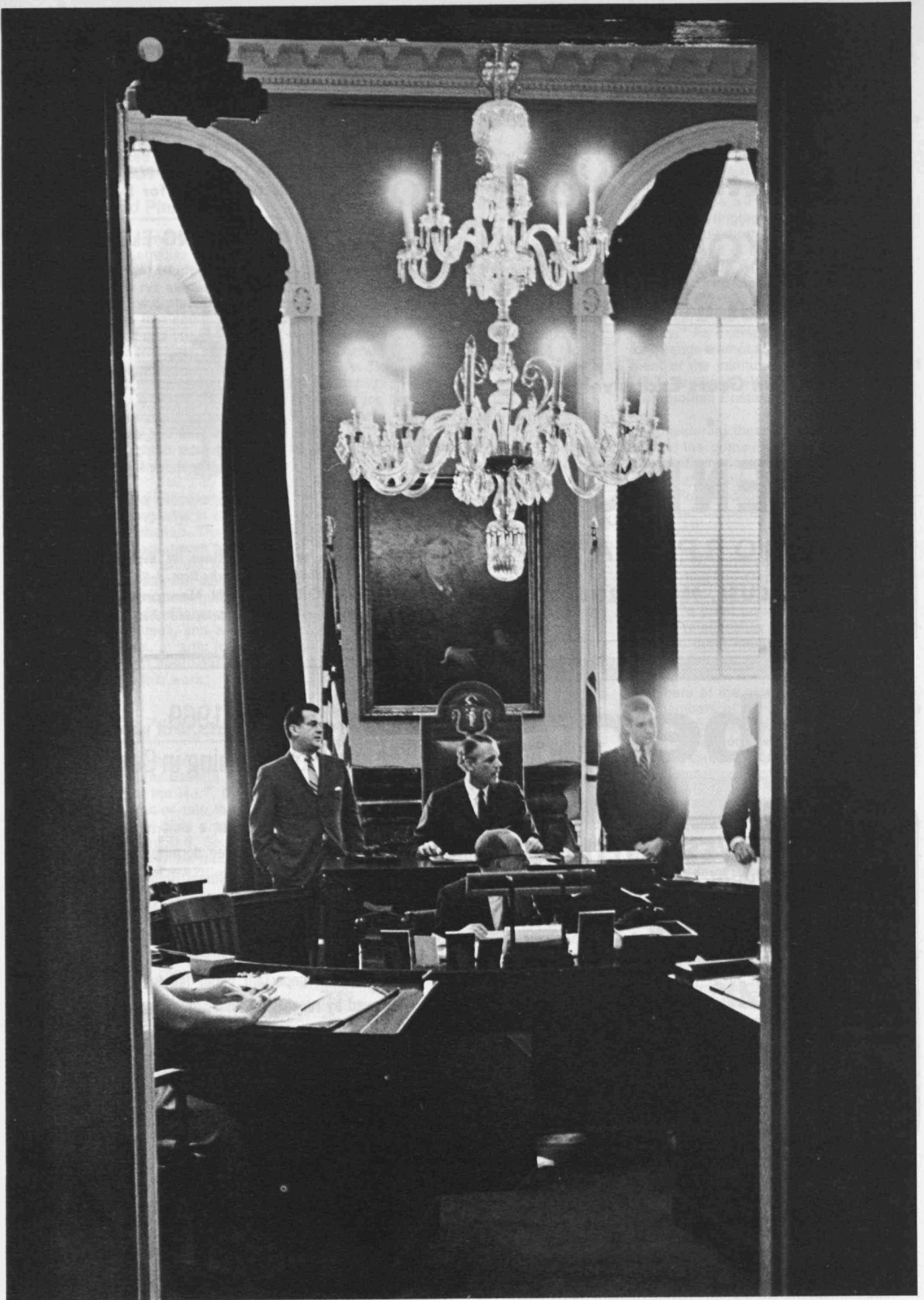
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The 1969 Alumni Homecoming in Cambridge

If this is your reunion year, a visit to Cambridge for Homecoming is a must (free dormitory rooms for reunion attendees). For all alumni Homecoming in June is a perfect time to visit MIT, to see your friends, and former professors. There will be lecture demonstrations on new areas of research, the annual alumni luncheon, an important panel led by Dr. Killian, all followed by reception, dinner, dancing, and entertainment.

Remember June 16th. Register now using the form mailed to alumni, on May 10, or send \$14.75 per person to the Alumni Association, Room E19-439, MIT, Cambridge 02139.

**REGISTER NOW FOR
MONDAY, JUNE 16, AT MIT**



A Republican conservationist is bringing his M.I.T. training in analysis and logic to bear on leading a state which often defies them both.

Crocker Snow, Jr.
Political writer for the Boston *Globe*

Through the School of Hard Knocks

It was a pleasant Indian summer day last October when President Nixon made his only campaign visit to Boston. His stop-over was carefully programmed without any public rally for fear of action by student provocateurs who had clouded earlier Boston appearances by Hubert Humphrey and George Wallace.

Instead, Mr. Nixon sequestered himself at the Somerset Hotel, behind a modest picket line of students supplemented by two leghorn chickens with the name-cards "Tricky Dicky" and "Spiro," and various Republican officeholders—Governor John A. Volpe, Senator Edward Brooke and state Attorney General Elliot L. Richardson—filtered into the hotel for a partisan pitch from the candidate, studiously ignoring the protestors. An exception was Francis W. Sargent, '39, then the Lieutenant Governor of Massachusetts; on his way into the Somerset the Lieutenant Governor accepted a hand-out entitled "Nixon—Where Do You Stand?" from Jonathan Margolis, a Harvard Law School student from Newton. An hour later as Sargent left the Somerset he sought out Margolis to acknowledge reading the student statement.

The incident is revealing of the character of Massachusetts' new governor. He is not doctrinaire. He is informed, interested and anxious to please. And he is an attentive politician.

Governor Sargent is an M.I.T. man and proud of it. He keeps a card under the glass top of his desk in the third floor corner office of the State House reading: "Don't ask me—I didn't go to Harvard." A Dean's List student, he completed four years of a five-year M.I.T. architectural program in 1939 and was awarded a special degree.

"An unusual background I suppose for my job now," he says today. "But it taught me good logic in analyzing a problem from all points of view before

making a decision. I might have had a tough time at a liberal arts college like Harvard where it's possible to coast along and then cram at exam time. At M.I.T. I had to push myself at the time."

The tall and athletic 43-year-old Dover resident began his two-year term as Governor Volpe's replacement in an unenviable position. Problems are pressing in from all sides, particularly fiscal ones in a state where the first billion dollar budget in 1968 has become a billion and a half for 1969. For the first time in Massachusetts history, Democrats control more than two-thirds of the seats in both House and Senate (the number necessary to override a Governor's veto), and they are not eager to cooperate with a Republican chief executive they hope to topple in 1970.

However, Governor Sargent starts with the distinct advantage of great personal popularity among his fellow Beacon Hill politicians, and he seems so far to be escaping the debilitating back-biting common to the trade. He is known as a "good democratic Republican," he once was described by a state Democratic firehorse as the rare Yankee Republican who wouldn't be an embarrassment in a South Boston bar.

Because of his nice-guy image, Governor Sargent has been characterized as one who avoids a fight. He bristles at the charge. A man known for his hunting and fishing activities and commercially wedded to these pursuits as founder of the Goose Hummock sporting goods store in Orleans on Cape Cod, Mr. Sargent contends that he was the first public official to come out for the Cape Cod National Seashore. "That enraged all my natural constituents. I caught it from most of my neighbors down there. Old friends vowed that they wouldn't ever shop at my store any more. But we worked it through, and it's a good thing." As most outdoorsmen would display a game trophy, Governor Sargent has hung

Massachusetts Governor Francis W. Sargent, '39, presiding at his first Governor's Council meeting in January following his elevation from Lieutenant Governor—the result of former Governor John A. Volpe's departure for Washington as Secretary of Transportation in Nixon's cabinet. (Photo courtesy of the Boston *Globe*.)

the pen with which President Kennedy established the national seashore on his office wall, mute testimony, as he sees it, of a personal tendency to "fight the good fight."

Last April, prior to the nationwide surge of conscience occasioned by the assassinations of Martin Luther King and Robert F. Kennedy, Sargent again antagonized many of his sporting friends when he challenged the National Rifle Association at its annual dinner to spearhead gun control legislation instead of "either blocking it or offering mealy-mouthed plans that are more pabulum than reform." He was quickly branded a spear-carrier for Senator Thomas Dodd and the Kennedys by N.R.A. president Harold W. Glassen.

"Of course, I don't fight for every little thing that comes up," Governor Sargent says after citing these incidents as examples of his political courage. "I'm not like some stuffy Republicans who see everything in a moralistic way as either black or white."

Put another way by David B. Wilson, a Boston *Globe* political writer, when Governor Sargent officially took over from Volpe in January: "He has the patience of the fisherman who knows that if the fish are not biting they are not biting, that they may be available some other day, and that beating on the water with a fly rod will not attract them."

Sargent is devoted to politics, but he doesn't always take himself or his colleagues too seriously. At a G.O.P. campaign dinner in a Boston suburb last fall, he introduced the featured speaker, California Governor Ronald Reagan, as a man "as much profile as courage." The quip wasn't well received by the partisan Republican crowd, and one reporter was prompted to observe, "This isn't Sarge's type of crowd anyway. He's used to addressing Democrats."

Sargent's first exposure to the realities of Massachusetts politics came 20 years ago as Director of Marine Fisheries. Following wartime service as a ski trooper in northern Italy which led to two Purple Hearts and a Bronze Star, he started a charter boat fishing operation on Cape Cod. He became so vocal in his criticism of commercial fishing operations that Governor Robert Bradford named him to the Marine Fisheries post. It was the start of 15 years of conservation work, leading first to appointment as Massachusetts Commissioner of Natural Resources and then by President Eisenhower to direct a special four-year Federal Outdoor Recreation Commission.

Sargent's performance in Washington led to offers from President Kennedy to head the National Park Service and by California Governor Pat Brown to become Director of Parks and Recreation there. But he decided to return to Bay State politics, initially in the demanding position of head of the Department of Public Works. In 1966, when his second cousin

Elliot Richardson decided to run for election as Attorney General instead of re-election as Lieutenant Governor, Sargent made his first bid for elective office and won the state's number-two spot handily.

Like Richardson before him, he set out to turn the largely ceremonial position into something more. He was assigned by Volpe to brainstorm what proved to be an unsuccessful fight for reform of the state's civil service system. He achieved some prominence for his squabble with the N.R.A., and far more as Acting Governor in place of Governor Volpe (who was in Japan) during the period of widespread urban rioting immediately following Martin Luther King's death. Sargent drew praise for his low-key actions in damping of unrest in Boston's Roxbury district; in an article about it for the Associated Press he said, "Though it was never spelled out formally, the policy we followed amounted to this: continue ordinary activities as far as possible because action breeds reaction and nothing is as calming as routine."

Now that he no longer enjoys the luxury of the second spot, Governor Sargent is directly immersed in what he has come to describe as "the almost insoluble problems of state government." Urban affairs are at the head of his list, with all the attendant issues of health and welfare services, housing, education, and air and water pollution.

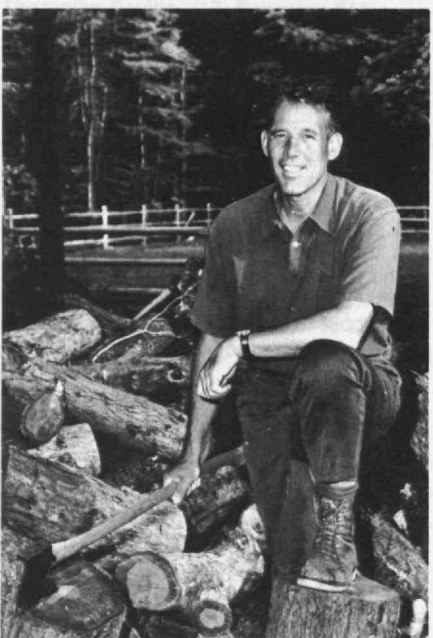
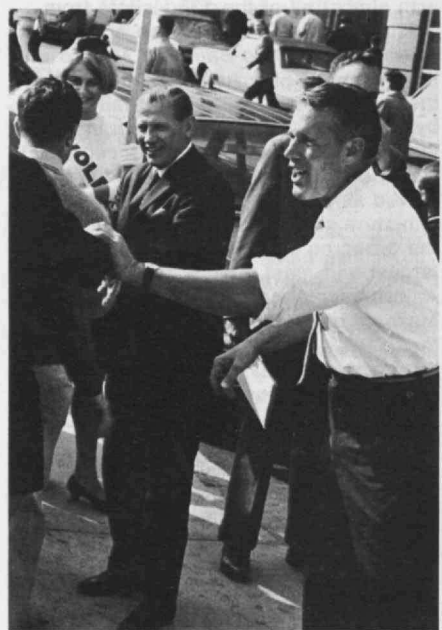
The Governor remains also committed to a major reorganization of the Commonwealth's structure in which dozens of departments, agencies and commissions have been grafted onto the executive branch almost without design. At present, 172 different bodies report directly to the Governor and 133 more are only one step removed. Governor Sargent favors a federal type of structure with 11 cabinet-level departments. To get it, he'll need the innovative ideas of many of the government professors from Harvard, M.I.T. and other Greater Boston institutions, and he is constantly soliciting them for advice. And he'll need some adroit compromise with the two Democratic leaders who are most likely to oppose him for the governor's chair in 1970, Boston Mayor Kevin White and Senate president Maurice A. Donahue.

Typically, on the day after his takeover from Governor Volpe, Mr. Sargent huddled with Senator Donahue informally and privately for over an hour to determine areas of mutual agreement. The new governor reportedly told the dour Democrat from Holyoke, "Considering 1970, I suppose I ought to start disliking you, but I don't know when I'll start." It is typical of Sargent's appeal. "I probably talk too much," he acknowledged recently. "But people want candor, and I think candor is what I have going for me."

How well qualified is he for the job ahead? "Well, you can say I've been through the school of hard knocks, and

I'd like you to quote me on that. As Public Works Commissioner, everything you do annoys someone. Everyone wants a road, but, you know, not here. I've been in plenty of positions where you had to say no, more than you could say yes. And that's just what I'm going to find as Governor."

Ardent outdoorsman and long-time public servant, Francis Sargent campaigns enthusiastically and enjoys a winter holiday with his family. (Photos courtesy of the Boston Globe.)



Alumni News

M.I.T. Club of Mexico City: 21st Annual Fiesta

Actually, the 21st Annual Fiesta of the M.I.T. Club of Mexico City started on March 12, the eve of its official opening with almost all of the 135 visitors from outside Mexico in attendance at the fabulous *Folklorico Ballet de Mexico* at the Palace of Fine Arts. They were joined the next morning at the University Club by another 100 alumni, resident in Mexico, for the registration procedure at which each alumnus and his lady received as name tags suitably inscribed miniature sombreros. Busses took part of the group on a guided tour of the world's largest and most famous Museum of Anthropology and others to its sister Museum of Modern Art, both in Chapultepec Park. Guides were Mrs. Leon Avalos, Mrs. Armando Santacruz B., and Mrs. Herbert Weinstein.

The noon get-together luncheon was opened by Club President Armando Santacruz B., '54, and turned over to Fiesta Chairman Herbert Weinstein, '66, who welcomed the guests and introduced the official representatives from Cambridge, Donald P. Severance, '38, Executive Vice President of the Alumni Association of M.I.T., and Mrs. Severance, and Howard L. Richardson, '31, Chairman of the M.I.T. Alumni Fund, and Mrs. Richardson. Special welcome was also extended to those present from the Classes of '21, '22, and '23, who were having interim reunions. Clarence M. Cornish, '24, former Club President affectionately known as "Mr. M.I.T. of Mexico," accomplished his usual entertaining introduction of every alumnus present. The "Eager Beaver" award was presented to Howard Richardson for having attended four Fiestas.

Speaking that evening in the spacious auditorium of the Museum of Anthropology, Howard W. Johnson, President of M.I.T., chose as this topic "Education for the New Technology." He told of specific progress in Cambridge and quoted as representative of the Institute's objectives a motto which once hung in the old buildings in Boston: "To train men liberally to be leaders." He stressed that leadership had increasingly encompassed problems relating both to technology and

to human significance. He termed modern technology a combination of the best technical information plus a sound knowledge of humanity, both of which are needed on an ever-widening base to create a "professionalism" higher than that which satisfies mere personal requirements. He particularly complimented the Mexican alumni for their achievements in this direction; also for their pioneer development of a "self-renewal" program at the Instituto Tecnológico de Monterrey. He said this program was an effective step toward developing good "enterprisers," having business managerial experience combined with technological competence, who would insure that progress happens. His concluding greetings in Spanish were particularly well received.

On Saturday morning, famous Mexican architect, Héctor Velasquez, '51, a member of the main board of architects and city planners and himself the architect in charge of the entire Olympic Village project (30 buildings housing 10,000 athletes), conducted the Fiesta visitors though a number of major Olympic installations, which were specially lighted and supplied with musical programs. Felipe Cortes, '67, also served as a guide and interpreter. At noon, a special *charreada* performance was given under the direction of Paul Gerard, '35, who also performed in the ring.

The *pièce de resistance* of the Fiesta was, as always, the *Noche Mexicana*, held this year in the beautifully decorated gardens of the home of Don Federico and Mrs. Tamm in San Angel. From hot punch through countless Mexican delicacies and beverages, the visitors enjoyed a sumptuous repast, punctuated with dancing and performances in authentic costumes by wives of Club members. Fireworks and demolishing the elusive *piñata* were the high spots of the evening. The latter, a monstrous M.I.T. beaver in sombrero and toreador outfit, finally succumbed to the effective blows of Mrs. Johnson and novelties for all poured out of the figure.

Thus the Fiesta in Mexico became "of age" and its circle of appeal widened as indicated by the numerous responses of, "I'll see you again next year!" Besides

President Santacruz and Fiesta Chairman Weinstein, the current Club officers are: Richard L. Bolin, '50, Vice President; Johan Palme, '66, Fiesta Treasurer; Avlino Manzanilla, '31, Publicity; Ian Clark, '61, Transportation; and Clarence M. Cornish, '24, Reception.

Stein Club: The Need to Face Reality

Fundamental attitudes about people and their affairs color Americans' view of modern urban problems, Irwin Rubin of the M.I.T. Sloan School of Management told members of the Boston Stein Club in March. The issue, he said, is to admit this fact and understand these attitudes. "Failing to 'tell it like it is' has been at the root of our troubles."

America is a racist society, Professor Rubin declared, citing examples of discrimination in social and professional affairs—and even charging the existence of discrimination at M.I.T. But it need not be so, he added: "Prejudice is a learned social attitude; people are not born to think as they do." And so it follows that "if we can understand the sources and reasons for our prejudices, then we can correct them," Dr. Rubin assured his Stein Club audience.

A "Majestic" Achievement Toward a New Frontier

Man's great adventure toward what Galileo called "a decorative lantern in our evening sky" is only the beginning; just as America was "a country of the imagination" for the people of Europe four centuries ago, so will the moon and the planets be America's frontier in the 21st Century, said Victor K. McElheny, Science Editor of the *Boston Globe*, at the March meeting of the Alumni Advisory Council.

Apollo 11—the first moon landing expedition scheduled for mid-July—is not a "conservative mission," said Mr. McElheny. Indeed, he said, "we are not prepared for the kind of emotional climax which will prevail in the U.S. 'if that mission succeeds.' The nation will have quickly to decide on the next steps in space, and will do so in a climate 'very favorable' for the future plans of N.A.S.A.

The result, said Mr. McElheny, will probably be plans for a series of space flights for manned lunar exploration, the establishment of a number of orbiting space laboratories, communications satellites which will be "one of the great revolutionary forces to be loosed on earth," unmanned vehicles to orbit and land on Mars and Venus, and perhaps a vehicle to attempt the "grand tour" of the outer planets late in the 1970's. All of this, said Mr. McElheny, is "more or less purchasable with a continuation of the present N.A.S.A. budget."

By this time, said Mr. McElheny, man will have had "a lot of additional residence time in space," and Mars will have become "a new country of the imagination," to which there will be pressure for manned missions. Meanwhile, these achievements will have represented a "great stretching" of electronics technology and a truly "majestic" achievement of ordinary people "who are not tools of machines but who use machines as human beings—as you and I would."

Deceased

Sidney E. Horton, '90, March 1
Walter S. Leland, '96, May 31, 1968
Clyde Mac Cornack, '03, October 23, 1968
Herbert L. Williams, '06, December 25, 1968
James M. Burch, Jr., '08, January 14
Walton G. Harrington, '10, March 5
Robert G. Daggett, '13, March 3*
Ernest S. Neily, '13, October 31, 1967
Dean A. Fales, '14, March 5
David F. Condrick, '15, September 5, 1967
Harold E. Hadley, '15, June 26, 1967
John S. Howkins, '15, December 19, 1968
Lovell W. Mason, '15, May, 1968
Jewett B. Newton, '15, January 30
Thomas C. Pond, '15, November 24, 1968
Warren C. Whitman, '15, May 18, 1968
Willard E. Bonnell, '17, November 2, 1968
Robert S. Moulton, '17, January 19
Ernest M. Pace, Jr., '17, March 6
Thorndike Saville, '17, February 24*
H. Loring Wirt, '18, March 5*
Warren L. Cofren, '20, August 27, 1968
Erskine Daniel Lord, '20*
Harry M. Myers, '21, December 22, 1968
Marvin Eickenroht, '23, February 22*
Harry M. Chatto, '23, December 10, 1968
Parker B. Holden, '23, February 21
Donald B. Mason, '24, February 20
Donald W. Mc Cready, '24, October 15, 1967
Stanley W. Davis, '25, January 11
Fred Walker, '25, January 7*
Arturo Marques, '27, October 13, 1966
Ford W. Sammis, '28, February 4*
Allen Richmond, '28, January 24*
Harry R. O. MacNevin, '31 January 28
Charles F. Feuchter, '34, April 27, 1968
Francis P. Mahaney, '34, January 3
Michael J. Lach, '36, February 12
Morgan C. Rulon, '36, December 29, 1968
Seymour Gross, '38, February 10*
Alva Lewis Herman, '39, January 20*
Kenneth W. Root, Jr., '39, November 24, 1968
Frederick C. Johnson, '39, May 26, 1965

Swante Mellgren, '47, January 9
Kenneth S. Welsh, '58, December 26, 1968
*See Class Review for further information

Alumni Calendar

Buffalo—May 15, 6:30 p.m.—Annual Dinner Meeting. Speaker: Dr. John F. Storri, University of New York at Buffalo. Topic: Under the Bahama Reef.

Cambridge—Saturday, May 3—M.I.T. Open House

Cambridge—May 7—Stein Club, Faculty Club Lounge. President Howard Johnson and Dr. Julius A. Stratton will be guests at the dinner featuring presentation of additional funds which will carry the Stein Club Freshman Scholarship Fund beyond the quarter of a million dollar mark.

Fairfield—May 20, 7:00 p.m.—Joint M.I.T./Wellesley Dinner Meeting, Shorehaven Golf Club. Speaker: Professor Gyorgy Kepes, Director of the Center for Advanced Visual Studies. Topic: Values of Visual Arts.

Houston—Thursday, May 1, 6:30 p.m.—Joint M.I.T./Harvard Business School Dinner Meeting, Marriott Motor Hotel. Speaker: Arnold E. Amstutz, '58, M.I.T. Associate Professor of Management. Topic: Mathematical Simulation of the Stock Market.

Long Island—May 9, 7:30 p.m.—Dinner Meeting, Royal Viking Restaurant, Woodbury. Speaker: John S. Saloma, 3d, '56, M.I.T. Associate Professor of Political Science. Topic: Nixon, his Cabinet and the Congress.

Newark—May 21, 6:30 p.m.—Annual Dinner Meeting, Robin Hood Inn, Clifton. Speaker: Dr. Julius A. Stratton, '23, Ford Foundation.

New Haven—May 22, 6:00 p.m.—Dinner Meeting, Yankee Silversmith Inn. Speaker: Captain W. E. Simmons, Professor of Naval Science, Yale University.

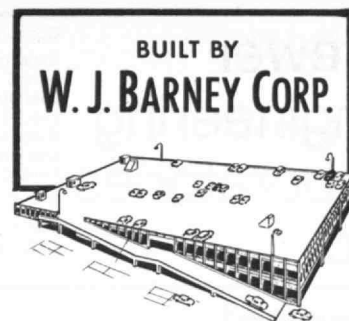
Portland, Maine—Thursday, May 15, 6:00 p.m.—Dinner Meeting, Holiday Inn. Speaker: Donald P. Severance, '38, Executive Vice President, M.I.T. Alumni Association. Topic: What is Changing Around the Institute.

San Francisco—Tuesday, May 6—Dinner Meeting. Speaker: Professor Walter A. Rosenblith, Chairman of the M.I.T. Faculty.

Seattle—June 5—Dinner Meeting. Speaker: Paul E. Gray, '54, M.I.T. Assistant Provost. Topic: The Changing University.

Washington, D.C.—Thursday, May 8, 6:00 p.m.—Dinner Meeting, University Club. President and Mrs. Howard W. Johnson.

Homecoming—June 16, 1969



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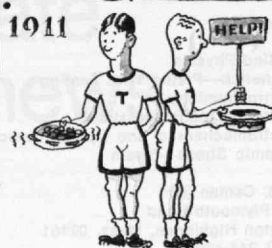
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OTHER MAYS

and some of the things that made them memorable.....or at least, different!

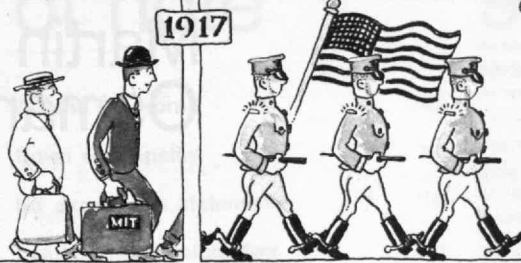
1911



Crash fund drive successful. Entire track team (including Coach Kanaly) travels up to Dartmouth. (Loses)



1917



Fifty men (including six faculty) leave for Plattsburg Reserve Officers Training Camp to become "Ninety-Day Wonders."

1922

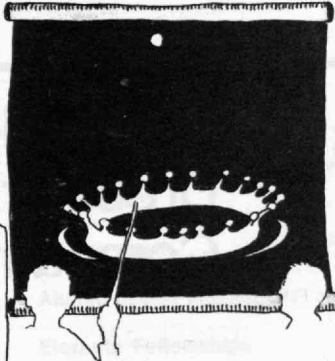


Prof. Norbert Wiener invents three-man chess. Requires "secret alliance" of two players, then one double-crosses the other.

1927-First strip of grass invades pebble desert of the Great Court

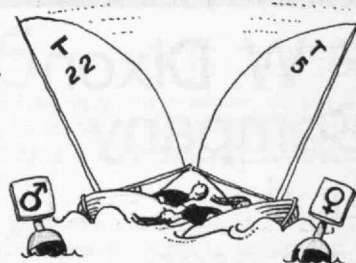


1933 ~25,000 attend biggest Open House yet, see H.E. Edgerton '27 and K.J. Germeshausen '31 drop milk.



1939

Tech sailors win Intercollegiates ~ so do sailorettes



1941



Fan dancer Sally Rand, headed for Harvard appearance, is kidnapped by Dorm devotees of terpsichore.

1945

VE DAY

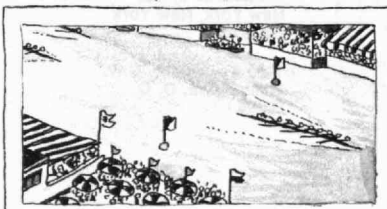


Lights go on again all over M.I.T ~ first time since 1941.

1950 MDC instals parking meters on Memorial Drive, challenging student ingenuity. (MDC loses)



1954 For the first time in history an MIT crew (the light weights) is invited to the Henleys.....and wins!



1955 Lightweights invited again-win again!!

1960

Second Century Program unveiled. Slogan: "From Strength to Greater Strength."



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Class Review

late news

of note

Around the Horn
Down with apathy
No ex cathedra statements
Land of the Midnight Sun
Hall of Fame
River expert
Helpful hint
No longer honorable?
New Visiting Professorship
Teledyne Founder
"Gaplash"
All you need . . .
Alumni spend and save
Eloranta Fellowships

90

Sidney Ellsworth Horton died March 1, 1969, at the age of 100. Former president of the E. Horton and Son Co., of Windsor Locks, he was director of the Gabb Special Products Co., of Windsor Locks, until his retirement. He was also the former New England representative of Bardons and Oliver Machinery Co., of Cleveland, Ohio. His memberships included: the Congregational Church, Hartford Manufacturers Association, the Masonic Lodge and the Blandford's Fox Hunters Club. He leaves a daughter, Mrs. John B. Sanford of Walpole; a son, Sidney E. Horton Jr., of Auburn, Mass., and a cousin, Mrs. Helena B. Spencer.

95

Despite the very rough winter, we are happy to report that we two rugged New Englanders are still on deck—Luther and I!

Signs of Spring are beginning to appear—a most welcome sight to young and old! I am fortunate to be able to walk outdoors and am interested in seeing the modern construction a-building all around us.—*Andrew D. Fuller*, Secretary, 1284 Beacon St., Brookline, Mass. 02146

96

These notes are being written on the official "last day of winter" and reminders of the big snows of February are still in evidence around Boston. With the advent of warm weather *George Harkness* returns to Dorchester from his winter home in Orlando, Fla., where he has spent the cold seasons for the past thirty years.

Richard O. Elliot, of Thomaston, Maine, sent a note just after his birthday in February. He states that this year 96 has a double meaning for him. By the time you read this, each member of the Class should have received a note from me about the disposition of class records, money and memorabilia.—*Clare Driscoll*, Acting Secretary, 129 Walnut St., Brookline, Mass. 02146

Copy for this issue of *Technology Review* was due from your Secretary about March 20. Information reaching him after that date will be reported in the June issue.

In memoriam: *Edward Kuttroff* entered eternal rest on February 11, 1969, in New York City. Services were at "The Abbey," 66th Street at Lexington Avenue, on February 14, 1969. The Clergyman who officiated was Pastor Robert D. Hershey. Sympathy to his family from the Class of 1898 was extended to his nephew, Louis Ruckgaber of Glen Head, N.Y.

A year ago in the *Technology Review* appeared a detailed, friendly report from your classmate Edwin. (Please see Class Review of the May 1968 issue.) He was a member of Course 10, Chemical Engineering, and retained an interest in M.I.T. throughout his lifetime.—Mrs. *Audrey Jones Jones*, Acting Secretary, 232 Fountain St., Springfield, Mass. 01108

03

Well classmates, when you read these notes assembled in March with high snow banks now about and but one auto lane in side streets, you can realize your Secretary's desire for spring atmosphere and the soothing tropical air you enjoy.

Clarence M. Joyce, Course V, writes me as stated in the February Review, that he has cordially invited any of our classmates when passing through New York to call upon him at his new address—31 The Crescent, Montclair, N.J. 07042. He also says that he plans to take another European cruise this coming July with Mrs. Joyce on the *Gripsholm* to the North Cape and Norway coast, Sweden, Finland, Leningrad, Copenhagen, Hamburg, and Ireland while living on shipboard throughout. He will be accompanied by a couple from the Unitarian Church to alleviate the strange atmosphere of the varied cities.

Around the Horn

Another inspiring letter arrived from *George E. Kershaw*, Course XIII, of 43 Fairwood Road, Madison, N.J., 07940. He will be pleased to learn that our classmates are still an active group of about forty members. He apologetically admits he has "been out of touch with our classmates for a long time, being constantly on the move." He has lived on five continents. From a ship building family, he has been tied to ships and salt water since the age of fifteen when, as a cabin boy, he rounded the "Horn" to Australia on a "Wind Jammer."

Since retiring voluntarily in 1961, at 80 years of age, he has cast anchor. His journeys have taken him to all the world's large seaports and a goodly number of smaller ports, visiting their back country. Fortunately, his health is still normal which enables him to get about almost as he did forty years ago. Mrs. Kershaw passed on in 1961, since then he has enjoyed the companionship of his two sons, three

grandchildren and five great-grandchildren.

He still hopes to make one more visit to Vienna, which, when he first visited it was a dual monarchy and Franz Joseph was King of Austria. Vienna then rivaled Paris as the gayest spot in the world. The presence of so much royalty (now long gone) contributed greatly to its prominence. In conclusion, he enjoys news of his many classmates and wonders how many of the Old Timers of '03 are still on their hind legs and navigating under their own sail. His high school class of 1899 has dwindled to six members from a total of 188. We one and all wish George the long continuance of his *bon esprit*.

We still miss our Happy Birthday column in former Reviews and hope to see it restored.—*John J. A. Nolan*, Secretary and Treasurer, 13 Linden Ave., Somerville, Mass. 02143

04

I am sorry to say that no '04 class news has come to my desk recently, so due to Mrs. Russell's illness and a personal bout with the Newton Wellesley Hospital I have not been able to scout around for material for this column.

When this issue of *Technology Review* appears in the month of May you will have received all details of the M.I.T. Reunion in June. I have received no suggestions as to our 65th, but if any members of the Class plan on coming to Cambridge at that time there will be an '04 table at all the eating functions.—*Eugene H. Russell, Jr.*, 82 Stevens Rd., Needham, Mass. 02192

05

The most important thing this month is to tell you about the most recent honor which has come to *Doc Lewis*. An endowed professorship at M.I.T. has been established in his honor and it was recognized by a luncheon at the M.I.T. Student Center on March 7. Present were many prominent men (and women) of national, state, and educational prominence. Our president, *Hub Kenway* attended and has written me a quite ample report. You will undoubtedly read of this in this issue of the Review.

Hub writes, "I don't know anyone to whom life has given so much. His wife, sister, his son, Warren, Jr., and both daughters were present. His other son, Clay, is setting up a Chemical Engineering College in Formosa." I might add that I know of no one who has given so much to his students and the chemical engineering world. Sometime at a reunion or Alumni Day Luncheon, ask Hub to tell you about Doc's encounter with his mules at his old homestead farm in Delaware back in 1900. The mules apparently had a mind of their own, and you know Doc.

Here are some further gatherings from my Christmas cards. *Herman Eisele* writes: "A few words about myself. At 86½ years I am still fairly active. I usually go to my office five days a week where I still do a little professional work and take care of various personal matters. My cataract operation two years ago has prevented me from driving. This gives me a serious inferiority complex. However, I am learning to ride the busses which I don't like; but I notice I have plenty of company. Although I have many limitations, my several specialists tell me that the condition of my health is quite satisfactory. I am living alone in the apartment where Mama and I lived for 14 years. I have a good housekeeper who comes in 1½ days a week and takes care of housework for which I never had any talent. So I am getting by."

A. Warren Wells apparently has a secretary for Mrs. Wells writes: "Though we are shivering in our boots from the mean "Northers" coming our way, we still think you'd better dig out and enjoy our sunshine! Enjoyed your report of your cemetery activities! Hope all goes well with you. We jog along pretty well. I'm back full time on my job and Warren 'putters around' and helps me."

Warm weather friends

Obviously to take my mind off our towering New Hampshire snowbanks some of our warm-weather friends write me. For instance, *Lloyd Buell*, Course III, writes: "You write from behind a snowbank. Here I have just cut some narcissus and turned on the sprinklers. One of my memories of Tech is of the tulips along the curb in front of Rogers and the pansies that followed them." No wise-cracks, please. And *Roy Allen*, Course III, piles it on as follows: "Our flowers have bloomed all winter and fruit trees are in blossom." Remember these notes are being written in the middle of March. My retort could be—Yeah, but I am now looking on the beautiful snow covered Sandwich range, with the very photogenic Mt. Chocorua on the eastern end.

Just had a card from our globe trotters, the *Carleton Atwoods*, at the time of writing in Caracas, telling of travelling all South American countries. He sends you "kindest recuerdos," if you understand. You don't have to ask if they are hale and hearty; their goings tell. Just when I get our new Assistant Secretary *Ball* settled he moves again, this time into their newly built house, with address Box 8544, Bayshore Gardens, Bradenton, Fla., 33505.

Deceased

Mrs. Edward P. Ripley, Course V, of Weston, Mass., died on July 2, 1968. In February 1964 she wrote: "As Edith Wheeler I was a member of the Class of '05, taking some refresher courses. I am now Secretary of the Class of 1896, Smith College, am over 90 years old."—*Fred W. Goldthwait*, Secretary, Center Sandwich, N.H. 03227, *Wm. G. Ball*, Assistant Secretary, Bradenton, Fla. 33505

06

With the deadline for May notes fast approaching I was destitute of news until a 1932 man who lives in Springfield sent me an obituary clipping he had spotted in a local paper. That's an example of the fine help secretaries are getting nowadays and my thanks were sent promptly to Sidney Friedman for his help. *Patrick James Kennedy, Jr.*, Course II, was born in Holyoke, Mass., January 1, 1885, lived in Holyoke most of his life, and died there March 14, 1969. He was with us all four years and his thesis—with W. A. Hardy—was *Test of a 1500 KW Parsons Turbine*. His first job was as engineer, and later superintendent of construction, of the Penn Tunnel under the Hudson River, then Chief Engineer during construction of the Pacific Street subway in Brooklyn. In 1910/11, he was engineer for No. 3 Drydock Caisson Cofferdam at the Brooklyn Navy Yard. Then for awhile he was a partner in a construction firm in New York City until he moved back to Holyoke in 1918 and founded the contracting firm of Patrick J. Kennedy Co., which is today headed by his son. His firm did much large building work in the vicinity. In 1936 Patrick was consultant for the Holyoke Water Power Company in studying flood control on the Connecticut River—with the same problem shaping up this year!

Patrick's civic and church activities were many—Knights of Columbus; Holy Cross Church Men's Club; Lodge of Elks No. 904 and its Past Exalted Ruler; a charter member of the Rotary Club; member of T.A.P.P.I. (Technology Association of the Paper and Pulp Industry); American Paper Mill Superintendent Association and the Golden Guard of his fraternity Theta Chi. With his wife Helen L. (Douglass) he celebrated their 50th wedding anniversary last November. A note of sympathy from the Class was sent promptly to Mrs. K. and family.—*Edward B. Rowe*, Secretary and Treasurer, 11 Cushing Rd., Wellesley Hills, Mass. 02181

07

Winter certainly surprised us with the recent storms, and I hope by now everyone is returning to normal and is looking forward to spring. It doesn't seem possible that it is just around the corner, does it? I was very fortunate in that the daughter of my older son was married on February 8, the day before the unforgettable storm of February 9. From all reports, the so-called "white gold" was not so graciously received by the people up north. As one resident of North Conway, N.H., stated: "The problem is not enough snow, but knowing what to do with what we have. I shoveled every day, made no progress, and finally decided to shovel a path from a second-story window and then had no trouble." I imagine, even with the inconvenience of it all, many people used their cameras to

good advantage and will long relate their experiences of "the storms of 1969."

I went into the hospital on February 20 and came home the following Wednesday, the 26th, so escaped that second storm. I am glad to report that the doctor seems to be pleased with my progress and says I am coming along very, very well. The cards and letters which I have received during my illness and convalescence were most welcome and have given us much pleasure.

Don Robbins, our President, has been most thoughtful, writing and calling me often. In his last letter he wrote that he and Mrs. Robbins were unable to get out-of-doors for their usual walks because of the weather, but they enjoyed watching the birds from their window. It is nice that Don has improved so well since his recent illness.

This past month brought me little or no class news, so that explains why these notes are of a more personal nature than usual. I hope that with the coming of spring, many of you will find it possible to write to me, giving me a little information about yourselves and your families that I can use.—*Philip B. Walker*, Secretary and Treasurer, 18 Summit St., Whitinsville, Mass., *Gardner S. Gould*, Assistant Secretary, 409 Highland St., Newtonville, Mass.

08

With sorrow we note the passing of *H. Leston Carter*, of 14 Roslin St., Waban, Mass. He was vice president and chief engineer of the Boston Manufacturers Mutual Fire Insurance Co., with which he served for 43 years, retiring in 1951. He leaves two sons, Richard L., of Troy, N.Y., and John W., of Wyckoff, N.J., and a sister, Mrs. Arthur Flinn of Newton, Mass.—*Joseph W. Wattles*, 3d, Acting Secretary, Box 421 Casey Key Road, Route 1, Nokomis, Fla. 33555

10

Notice has been received of the death of *Jay Wesley Cilley*, 83, of Melrose, Mass. He was born in South Newbury, N.H., and was a resident of Melrose for more than 50 years. He was a retired electrical engineer and was a member of the First Congregational Church in Melrose. A 1910 graduate of M.I.T. he was a 60 year member of St. Peter's Lodge, AF-AM, No. 31 in Bradford, N.H.

Your secretary is at a total loss for news other than the above, however he wishes to state that he is preparing a letter to every member asking for Class Dues in preparation for our 60th Reunion in June of 1970. You will probably receive the request for dues before you read this, however, here is a second notice for those who have not paid their dues.—*Herbert S. Cleverdon*, Secretary, 120 Tremont St., Boston, Mass. 02108

11

In as much as I have been urging classmates to send me the stories of their lives, it occurred to me that I ought to do as much myself. Here goes. I was born August 14, 1888, in Wakefield, Mass., and lived there until my mother died in the spring of 1900. Then my father took me to live with my half brother (22 years older than I) in Dorchester where I lived until after graduation from Tech. I graduated from the Edward Everett School in 1903 and from the Mechanic Arts High School in 1907. My career at Tech was undistinguished and I took no part in any undergraduate activity, returning home to Dorchester every day as soon as classes were over. I did get my degree in Mechanical Engineering.

After graduation, *Ernest Battey* and I went out to Holyoke to learn the paper making business at the American Writing Paper Co. Ernest mentioned this in his autobiography in the May, 1968, Class Review. We worked on the paper making machines 6 eleven-hour days one week and 5 thirteen-hour nights the next for 16½¢ per hour. The low pay and the lack of any program for teaching us the business caused Ernest to quit in early August. I stayed until Labor Day. The next week I got a job in the drawing room at the Worthington Pump Works in Harrison, N.J., where the starting pay was 33¢ an hour for a forty-eight hour week. This was the closest I ever came to working as a Mechanical Engineer and I stayed on the job until the following March. I then quit and joined a two masted schooner in Santiago, Cuba, spending the next six months on it. Leaving Santiago, we stopped for various periods at Caimanero (on the upper end of Guantanamo Bay and the port for Guantanamo City), Morant Bay, Kingston and Sav-la-Mar on the south coast of Jamaica. Returning to Boston in the fall of 1912, I went to work for the most part in the field for Clark & Lee, Inc., building contractors, a firm started by my father and at that time operated by my half-brother. I continued working for this firm off and on until the fall of 1917. My last job with them was as superintendent, building three buildings for the Great Falls Manufacturing Co., in Somersworth, N.H. It was during this period that I began drawing plans for buildings. I am a registered Structural Engineer in Massachusetts and have made plans for about 150 buildings. In between jobs for Clark & Lee, I worked one winter for Monks & Johnson, Engineers as inspector of construction on a large building in Cambridge. I put in several months in the office of Daniel Shepard, a building contractor. Another winter I set up the equipment in the paint mill of Means & Thatcher, a building for which I made the plans and helped to build.

In the early fall of 1917 I heard from Ernest Battey that there was an opening for a structural engineer in the Engineering Department of Frank A. Sayles,

Textile Finishers, in Pawtucket, where he was working at the time. I took the job and stayed on it until I was drafted into the army the next March. My biggest project there was the design of a building for a small water power plant at Mechanicsville, Conn. It was during this period that Ernest Battey and his wife introduced me to Alma Brown who consented to marry me 12 years later.

My eight months in the army were uneventful. After a month at Camp Devens I was shipped to Camp A. A. Humphreys (not Fort Belvoir) where I spent five months teaching mechanical drawing and then two months in the Engineer Officer's Training School. I was discharged in time to get home for Thanksgiving, 1918, and the following week went back to Pawtucket. While I was away, Sayles had started a construction company (Central Construction Co.) and I was assigned to put in a cost keeping system on their jobs. I started on the water power job—I had worked on the plans—and stayed there, living in nearby Putnam until the following June when I was called back to the Pawtucket office and made estimator in addition to my cost keeping job. I stayed on this job until March, 1920, when I moved to North Weymouth and started my own contracting business.

Several years later I was joined by Ernest Smith, who had been my foreman, in forming Clark & Smith, Inc., and opened an office in Quincy. I had been interested in precast concrete for some time and in 1927 Mr. Smith and I, together with Albert Nelson started the Nelson Cement Stone Co., in Braintree. A year or two later, Mr. Nelson dropped out and I took over the management of that company. By 1933 the depression had caught up with both Clark & Smith and Nelson, so Mr. Smith and I decided to split up. He took Clark & Smith and I took Nelson. I am glad to say both companies survived. More trouble came during World War II, when lack of cement shut down the precast business. We were fortunate to get a job making plaster models of rubber airplane tanks. We had only one customer, Hood Rubber Co., but the business was profitable. I turned the running of the shop over to my associate, Harry Desmond and took a job as expeditor for the Laing Co., ship fitters, who had a multimillion dollar job at the shipyard in Providence.

On August 14, 1948, a telephone call stopped the plaster model business dead and we went back to making precast concrete. In late 1967, following the death of Harry Desmond, I decided to sell out and retire. I sold out all right and for cash, but Leon Levitan who bought the business wanted me to stay on for a while. I am still there a few hours a week.

Shortly after I started my contracting business in Weymouth, I joined the local Post of the American Legion and over the next few years held several of the offices in the Post, becoming commander in 1927. I was on the committee that bought Legion Hall from the Grand Army

and became the treasurer and manager of the Legion Building Corp. For about 15 years I struggled to make the rentals cover the expenses. In 1925 I joined the Rotary Club of Quincy and later transferred to the Braintree Club, where I served one term as director and am still a member. In 1927 I became a Director of the Quincy Cooperative Bank (number three in size among the cooperative banks of Massachusetts) and served for 30 years, the last few years as senior vice-president. We were granting about 100 mortgages a month and along toward the end I was spending as much as 15 hours a week inspecting properties to OK payments. This got to be too much for me in addition to my own business and I did not stand for reelection in 1957.

Since 1923 I have been a member of the Massachusetts Charitable Association and was a member of the Board of Government for 6 years. This is the association founded by Paul Revere in 1795 which owned the Mechanics Building. Shortly after Alma and I were married in 1929, we formally joined the Third Universalist Church of Weymouth and I have been either an officer or a committee member ever since. This includes three years as treasurer and three as moderator, and I am now one of the trustees of the Permanent Fund.

Well I have done my best to make a very ordinary life look important and I hope it will encourage some of the rest of you to send me the stories of your lives.

Moves

A recent letter from *Wellesley Cushing*, who is now living with his wife in Kansas City, told of his project to bring the Cushing genealogy, which was published in 1905, up to date. He sent out 500 questionnaires to all the Cushings whose addresses he could find and was able to add 700 new names. He is having his work published this spring and should be happy with a job well done. He said he and his wife are in good health. He has two married sons. His daughter died last year.

Edward M. Suess has a new address: Zaragosa 255 Apartado #50, Saltillo, Cuah., Mexico.

Deceased

W. J. Seligman of Hollandale, Fla., died last November. He was born in Boston, October 1, 1889, prepared for Tech at Brookline High School. He graduated in Mining Engineering. . . . *William C. Davis, Jr.*, of Norfolk, Va., died December 1, 1968. He was born in Starkville, Miss., October 7, 1888, and prepared for Tech at Phillips Exeter Academy. He graduated in Electrical Engineering. . . . *Edwin C. Vose* of Waban, Mass., died last February 2. He was born in St. Paul, Minn., September 7, 1889, prepared at the Newton High School and graduated in Sanitary Engineering.—*Oberlin S. Clark*, Secretary, 50 Leonard Rd., North Weymouth, Mass. 02191

12

DO YOU REMEMBER the group photo of our Class taken on Rogers Steps in 1911 showing a total of 402 men? You will be interested in our recent review. The roster revised to date, shows a total of 150 men now living, of whom 96 received a degree. The remaining 54 men did not graduate. In the past two years, a total of 17 men have died. During this same period, Jay and I have written one or more letters to 138 men, requesting contributions and have received only 60 replies, including 6 from non-graduates. This leaves 42 living graduates, or 44 per cent, from whom we have as yet received no contribution. If you have not yet written, please make an effort to do so, even if only a brief note. If you have already contributed, perhaps you can write again. The continued success of the program rests with you.

We have just learned that *Arch Eicher* was stricken with a heart attack in February. He is recovering satisfactorily but must remain in the hospital for another operation. We hope and expect that all will go well and that he will be home again by the time this issue is received. We know that he will appreciate hearing from any of his classmates.

A letter from *Francis Kingsbury* reads: "Since graduation, I have been employed by the Massachusetts Department of Public Health, Division of Sanitary Engineering, for 47 years. I retired in 1959 at age 70, at which time I was in charge of all State public water supplies problems for cities and towns in the State, including special investigations. I was married in September, 1915, and have a son and daughter (another son deceased), four grandchildren, and one great-grandchild. We look forward each year to a visit from *Bill Collins* during Alumni Week, at which time we have an opportunity to review old times. My memories of days at Tech include two events, the cheers of 'Blackie ist gekommt!' when he appeared at our freshman luncheons, and Professor Vogel's German classes. In class one day I sang 'Die Lorelei' in German and the professor complimented me, which made me feel elated. So I tried out for the Glee Club but did not pass the audition. My voice was flat.

"Since retirement I have lived in Medfield, Mass., across the street from the house in which I was born, nearly 80 years ago, and close to my son's house. My daughter and family live in San Diego, Calif. My son, a civil engineer, and family are, of course, frequent visitors. We have done little travelling and are both content with country living and the friendships of our neighbors, their children and pets, the paper boy and the service men. I read a great deal in my low armchair, from which I am still able to get up without help. For years my hobby was carpentry, which included beaming the ceiling of the living room and glassing in the porch. Now I rather

like cooking, although at times it interferes with my wife's activities in the kitchen. For exercise I enjoy a walk in the nearby woods and fields. We are both in generally good health. May I close with sincere greetings to you and to all other classmates."

We have received a friendly letter from *Rock Comstock* from whom I had not seen or heard, I think, since graduation. After twenty years in Louisiana, he returned to Milford, N.H., on retirement in 1954 and five years later he lost his life's partner. He has four married children, scattered from Brooklyn to New Mexico, and lives by himself in a 165 year old New England house with some 40 acres of land, including a long-abandoned quarry. Although Rock is apparently in good health, he gets away from home very seldom, perhaps occasionally to see a play in Boston. He greatly enjoys the out-of-doors, particularly the woods and the trees, and is presently engaged in a war with the porcupines, who kill trees by chewing off the bark and branches, often overnight. It is a losing battle, however, despite the fact that he has liquidated 85.

A newsy letter was received from *Harold Mitchell*, our ornithologist, which included a description of a four month trip last summer to the Pacific coast and Alaska where he had an opportunity to see and study many unusual birds and animals as well as to attend the annual meeting of the American Ornithologists' Union at the University of Alaska in Fairbanks. On graduation in 1912, he became a sales engineer for the Buffalo Foundry & Machine Co., now a subsidiary of the Blaw Knox Co., after spending a few years in the rubber business. In 1929 he joined Potter and Dugan, Inc., manufacturers' agents, as a partner, and so continued until his retirement in 1959. Since then he has been most active in the study of bird life and served as president of the Buffalo Society of Natural Sciences for a number of years. In 1919 he married Mildred Dickson of Racine, Wisc. They have three married daughters, four grandsons and two granddaughters, whom they visit frequently. The interesting story of their recent trip will appear in a later issue of the *Review*.

Bob Cox writes as follows: "On graduation from Course III in 1912, there was no mob of proselytizers waiting for me. However, I managed to secure several offers, all of which were for \$50 a month and one at but \$10 a week. However, I finally departed for Silver Plume, Colo., where I worked in the mines as a laborer at \$3 a day comparative munificence. I soon departed for San Francisco where I accepted work with a realtor, but the net income was materially lower and after two years I went to Baltimore where I worked in a munition plant; then became an aviation cadet in the Signal Corps. After World War I, I returned to Baltimore and worked in the electric steel business, another throwback to Course III.

One summer I managed to get to Montana and Wyoming, and this experience shaped my future life. Two years later I married, and moved to Dubois, Wyo.—lock, stock and barrel—and became a dude rancher, a far cry from engineering. After five years with the *C M Ranch* at Dubois and the *E Bar E* in Montana, I ran our own *T Cross Ranch* in Dubois for 35 years. This was quite a different setting than the assay laboratory in the basement of the Rogers Building. And little support did we ever get from any M.I.T. connections, except that the late Karl Compton was with us for two summers. In 1965, we sold the ranch, which continues to prosper with younger and more aggressive management and the same ideals. We had but one son, Bob, Jr., whom we taught on the ranch through grade school, since no schools were accessible. He went East to prep school and to Tech in 1942, but was drafted after mid-years. He graduated from Stanford in 1946, then received his Ph.D. in chemistry and an M.D. from Chicago. He is now a practising pathologist, living in Saratoga, Calif. We are fortunate in having a small home next door to him and his family of five children. We really are retired here on our isolated hilltop, surrounded by orchards.

This is not the kind of success story to inspire present and future Tech students and might well have been a great disappointment to William Barton Rogers as well as to Professor Richards. Nevertheless, I look back on my four years at the Institute with the friends I made there, as some of the best years of my life, and followed by many, many more."

Jim Cook writes that he is now able to be about but used a cane during the slippery winter weather. His right leg is, however, now shorter than his left. Despite this handicap he is still as cheery as ever and has not lost his wonderful sense of humor.

A card from *Howard Cather* postmarked Great Abaco, Bahamas, indicates he is taking his usual winter vacation there. He says he is enjoying good weather, good food and bridge, but his luck at fishing has not improved. He tells of a spectacular view of a big tidal wave from his fifth floor hotel window.

Deceased

Belatedly, we have learned of the passing of *Wright Shuttleworth*, at the Royal Palm Convalescent Center in Vero Beach, Fla., on August 21, 1968, after a long illness. Warren was with the class for three years as a special student in Mechanical Engineering.

A brief note from the executors of *Max Levine's* estate, in reply to a letter recently sent to him, advises that he died in Honolulu on July 16, 1967. We understand Max was a Professor of Biology at the University of Hawaii.

We are sorry to report the passing of *Henry Johnson*, Course II, on January 17,

in Memphis, Tenn., after a brief illness.

We had just received a newspaper clipping from *John Pettingell* stating that Henry was celebrating his eightieth birthday on December 11, and had written to congratulate him. His daughter advised that he suffered a slight stroke in mid-December, followed by another a month later from which he did not recover. His brother, E. B. Johnson, 1916, has forwarded a brief resume of his life. Shortly after World War I, Henry became interested in malaria control and had a distinguished career in this work. At the time of the Pearl Harbor attack, he was engaged in the control of malaria on the Burma Road. Cut off by the Japanese, he escaped to Assam by foot and mule back over the Marco Polo trail, and was taken over by the Army. After the war he returned to this country and worked with the U.S. Public Health Service, rising to the rank of Lt. Colonel. He has resided in Memphis since the middle of 1920. His wife, Eula, died in 1961. He is survived by three daughters, four grandchildren and his brother. Our sympathy was extended in the name of the Class of 1912.

While in Florida this winter we have enjoyed pleasant visits with four classmates, *Jack Lenaerts*, *Paul Tyler*, *Hugo Hanson* and *Larry Cummings*. Jack and Marion are living at their lovely home in Venice where they have been since last fall. This summer they plan to divide their time between Yarmouth, Mass., on Cape Cod, Franklin, N.C. in the Smokies, and in the White Mountains of New Hampshire. Paul has a new home on Key Royale in Holmes Beach where they moved last year and are gradually becoming acclimated. Hugo and Edith live at Suncoast Manor, St. Petersburg, where they moved last July from Myrtle Beach, S.C. Hugo is recovering from another heart attack but is now up and about. Larry and Julie came to see us in Bradenton while they were staying at Clearwater Beach. They have returned to their home in Connersville, Ind., but plan to summer as usual at Squam Lake, N.H.

We had also planned to visit *Phil Jones* in Naples, but did not get the opportunity. *Jesse Hakes* writes, "Congratulations on your grand job in producing so much 1912 news. I'll try to send you something soon. I had a find year in my nursery and although I have been 'retired' about 15 years, I am working harder than ever. Good luck!"—*Ray E. Wilson*, Secretary, 304 Park Ave., Swarthmore, Pa. 19081; *Jay H. Pratt*, Assistant Secretary, 937 Fair Oaks Ave., Oak Park, Ill. 60302

13

We suppose that you have received and read Ellis Brewster's letter regarding 1913's contribution to the Alumni Fund. We have not made as good a showing yet as last year, but we feel that our record is better than all classes through

1914—except 1909 which will celebrate its 60th reunion this year.

Deceased

A most thoughtful note has been received from Mrs. Louise Daggett McKiddy enclosing a clipping which announced the death of her father, *Robert G. Daggett* who passed away on Monday, March 3, 1969, in Palo Alto, Calif. He is survived by his wife, Louiseanna Hess Daggett, another sister, Emma S. Daggett of Martha's Vineyard, a brother, John T. Daggett of Marblehead, Mass., a son, Robert G. Daggett, Jr., of Kansas City, Mo., and six grandchildren. Bob was born in Martha's Vineyard 79 years ago. Mrs. McKiddy notes: "The enclosed clipping regarding my father, Robert G. Daggett, '13, was published in the Palo Alto Times. He requested that contributions be made either to M.I.T. or the Arthritis Fund. For those of his Class who remember him, his death was sudden and apparently painless and he retained his charming sense of humor and interest in life to the end."

A letter was also received from Mrs. Mary (W. S.) Grissen of Palo Alto, Calif., and we quote: "I have just talked to Mrs. Cecil McKiddy (Louise Daggett) about the death of her father, Robert G. Daggett who died here last Monday. Mr. and Mrs. Daggett were close friends of ours for over forty-four years. I want to make a small donation to Mr. Daggett's college in his memory and Mrs. McKiddy said she felt sure if I sent it to you as the Secretary of his Class it would reach the proper place. So she gave me your address." Mrs. Grissen's donation has been forwarded to the office of the Alumni Fund and a note of thanks and appreciation have been forwarded to both Mrs. McKiddy and Mrs. Grissen. The Class of 1913 extends to the family of Bob Daggett its most sincere sympathy.

We received a very pleasant note from *George Sampson* and we quote in part: "Sorry to hear of your troubles, but I'm afraid that's the penalty we all have to pay for growing old. However, we're still here. I hope you and yours will be able to enjoy the coming years without all your troubles. The world is full of them."

We received an appreciative note from Mrs. *Edith Richter*, George Richter's widow. Mrs. *Marguerite Prescott Kelly* wrote to us commenting on the health of your Secretary. She stated that Prescott had experienced a very mild case of the "flu," but we judge he has recovered. As most of you know, Prescott and Marguerite have two children but six grandchildren and now five great-grandchildren. She longs to visit us in New England again. The Capens are looking forward to seeing the Kellys in the near future.

It was gratifying to receive a note from E. Dana Pratt and it was most praiseworthy of him to give *Bill Brewster*

credit for the showing 1913 made in 1967/1968 Alumni Fund contributions. He also lavished praise on the chairman for the success of our 55th reunion. Further, he believes that an interim reunion should be organized, for with a group of as many as 70, we could come up with good ideas or suggestions to assure a few hundred years of world peace.

John B. Welch writes a very interesting letter. Frances and John were sorry to miss the 55th reunion as they only returned from Florida in May. Due to a bad spell of illness for Frances (but not serious), the trip East was not feasible. John retired from the presidency of the Standard Dry Kiln Co., in 1961 and from the chairmanship and as a consultant in 1963. The company was sold in 1966 to the Dura Crate Co., Containers Manufacturers. The company was sold to John's old competitor from whom he won two kiln patent law suits in the lower as well as in the appeal courts in 1927. At that time, John merged the Welch Dry Kiln Co., with two of the largest Dry kiln companies in Portland, Ore., the leaders in fan kilns in the big western mills. This new company was the General Kiln Co., of New Orleans, Fla.

In 1929, John sold his interest in the General Kiln Company and joined the Standard Dry Kiln Co., in business since 1887. The Standard Company expanded to production of kilns for foreign markets in Thailand, Formosa, South Africa, Italy, and South America as well as all parts of the U.S. and Canada, finally furnishing PreFab aluminum panel buildings. They also handled kiln furnishings, fans, special motors for high temperature and humidity operative kilns in addition to stocking and handling equipment. In New England alone they had 269 kilns in furniture and woodworking plants. So now Johnny is enjoying his retirement. Well, we think with that very successful business life, you deserve retirement.

Herbert G. Shaw is one of our best correspondents. He wrote to us at Thanksgiving but due to ill health and the transition to a retiree from resigning my Civil Defense Directors job, I have failed to thank him for his interest in your Scribe's various ailments. At the present we are both in very good shape. Herb's cure for almost everything is: "Play plenty solitaire daily. Yes, we shall miss C. W. Brown for his ever cheerful letters were very enjoyable. The trip you and Leila had to Concord, N.H. and Burlington, Vt., in connection with your clock and watch meetings must have been very interesting. We are still making plans for an interim reunion in 1971.

We were very much pleased to hear from *Charlotte Sage* and we quote: "Here are my dues and a hopeful answer for a 60th reunion. Being just an oddment, I am not too enthusiastic about an interim, but you boys should have fun.

I was in Washington two weeks ago and had Molly Hart for dinner— a fabulous person. Her plane was at Hanscomb Field but she could not say when she would be up for it. I hope you and The Mrs. flourish." The last time we heard of Marion Hart, she was in her plane taking off from Charleston, S.C., for the West Coast of South America. So this is the lesson for May.—*George Philip Capen*, Secretary and Treasurer, 60 Everett St., Canton, Mass. 02021

14

Dean Fales passed away on March 5, 1969 at his home in Kennebunkport, Maine. He also had a home in Newton, Mass. Most of us will remember him for his interest in things automotive and he continued this interest throughout his professional life. He was the author of many articles and papers in the automotive field. After graduation he spent some years as instructor at M.I.T.

Herbert H. Hall died on December 6, 1968 at his home in Concord, Mass. After a few years with Factory Mutual Life Insurance Company he became associated with the Aluminum Company of America and he moved successively through assignments in several locations in Pennsylvania, New Jersey and Indiana.

Leigh S. Hall died March 1969 at his home in Concord, N.H. He spent a few years after graduation with the Navy Department in Washington, D.C. In 1919 he joined the Hall Brothers in Concord, N.H. as Treasurer and continued his association with this organization for the rest of his professional life.

Roswell Howard Annin died September 4, 1968 in San Francisco, Calif. After graduation he joined the Aberthan Construction Co. and his subsequent activities took him from Quincy, Mass. to California.

Down with apathy

The reunion plans evoked a response from *Henry Aldrich* which is interesting. A letter to Leicester Hamilton reads as follows: "Dear 'Prof,' Enjoyed reading the "News Letter and tentative Arrangements" as delivered yesterday. May I offer a couple of comments to dodge any charge of APATHY? In the first place, when you tabulated the 'wherefroms' you included me with the Floridians which is OK as far as it goes—i.e. we are in Naples-On-The-Gulf through the more rigorous days of March but will return with the Red Red Robins starting April 1—whereas and whereas etc., someone might get the idea we had abandoned our status as Wooden Nutmeggers and forget to look us up when passing within the field of influence of Middletown. Yes, we stand to benefit conversely by taking the nod from folks traversing the trail to and from Miami.

"In the next place, your statistics set me wondering how come I, as the sole survivor, apparently, of Course III to sub-

scribe to your efforts, should accept the role of 'maverick.' Let's put it another way—are there others among the 26 who 'declined' who feel somewhat as I do, that because of segregation into a not too popular course they would have all too little in common with the more popular varieties to justify the effort. If there be such, let them follow my example and come any way. As I probably have phrased it before we of Mining Engineering were orphaned along in the '20's and only a few were adopted by the course in geology. So, if there be those who hold back for similar reasons, tell 'em to break out of it and come along. And again, don't let the Alumni people get the idea we are here in Florida for good. I did tell them to send my *Review* here through the month of March and then resume the Middletown address. Best Alumni Magazine in the Field! Did I escape the grade of APATHY? Best regards, as ever, P.S.: Don't forget I was 'file closer' in the rear rank of the awkward squad of your company in Military Drill back there in 1910-11. 'Hamilton's Hikers.'"

Les Hamilton also received the following note from *W. H. John Leathers*, 182 North St., Hingham, Mass, 02043. "Still driving 125 miles a day, four days a week on business and enjoying it since the Stellite matrix in my fractured femur has made me tougher than ever. The score to date is 11 grandchildren and 1 great-grandchild but we are just beginning production."

Two more changes of address: *James B. Reber*, 8 Briar Hollow, Houston, Texas 77027 and *Hampar T. Gazarian*, c/o Charetti Prod Corp., 6 East 32nd St., New York City, N.Y. 10016.

You have all received details of the reunion. Those who are expected to attend together with guests are: Herman A. Affel, Henry Aldrich, Frank C. Atwood, Howard Borden, Homer Calver, Charles Chatfield, Elmer Dawson, Thorn Dickinson, Ray Dinsmore, Levi Duff, Linwood Faunce, Hampar Gazarian, Egbert Hadley, Leicester F. Hamilton, Arthur Johnson, Frederick Karns, Walter Keith, Walter Leathers, Raymond Maccart, William McPherrin, Paul Owen, Roy Parsell, James Rober, Ralph Salisbury, Alden Waitt, Harold Wilkins, Rudolph Zecha.—*Herman A. Affel*, Secretary, Rome, Maine, RFD 2, Oakland, Maine 04963

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You and your guests are all invited to the annual Class Cocktail Party and dinner on Alumni Day, June 16, at 4 o'clock at the M.I.T. Faculty Club. See you there! Truly, ours is The Class Supreme. Forty per cent of our total class membership (not all are active) have paid their bi-ennial class dues. This is a truly remarkable and moving example of class interest. With their checks came many letters which will appear in these notes. Many are from men I did not know, many

are from men I have not seen in over 50 years. The expressions of warm and friendly interests, the personal greetings and good wishes, the mild compliments have touched me deeply. These sentiments bear out what Alex Magoun (late 1918 Secretary) and Ralph Fletcher (1916 President) recently wrote about college classmates and are, in themselves, ample reward for the time and effort that go into this "labor of love" job of being Class Secretary. I acknowledge them with great pleasure and humility and wish I could answer and thank each of you. But, I leave you to judge my feelings.

On February 1, at The Church of the Resurrection, Hingham, Mass., Lucy and Harry Murphy's daughter Gail Harriet was married to William Henry Rowerdink, III. Lucy and Harry made an impressive appearance as the bride's parents in the beautifully decorated church and later at the big and gay reception at the Sheraton Plaza Hotel, Boston. Gail graduated from Cushing Academy and William is a Senior at the University of Maine. All the best to this fine young couple.

A brimming letterbox

Now for some of those dues letters. *Phil Alger*: "The only news here is that I passed through the critical 75 year point, as told herein, and am now on the down grade. But I am trying to have fun as I slide. The new edition of my mathematics book (McGraw Hill) is due out this week. Our 11 grandchildren are all well and expanding in all directions. I must get over to Boston this spring to claim that supply of the Elixir of Youth that my doctor said he has ordered for me—if I come to get it personally. I went down to the I.E.E.E. convention last week, and heard there that Fred Vogel is in charge of NEW inventions for his company, and is full of vim, but I missed seeing him. Helen joins me in sending best wishes to you both—do come to visit us again next summer in N.H." Phil enclosed his poem "Retrospect at Seventy-five," the first stanza is:

Listen, my friends, and you shall hear
Of my adventures, far and near—
Now my age is seventy-five
Hardly a man is still alive
Who can recall my birthday year.

Larry Bailey expects to be at the annual New York City Class dinner on April 18. *Dick Bailert* writes, "I am retired, as of January 1, 1969. But I am doing the same as I did before then, practically nothing, except an occasional trip to AMCHEM Products Inc., in Ambler, Pa. I worked from them about thirty years. I look forward to seeing you, and the others at the 1915 Class Annual Meeting in Fun City next April. By the way, the plan I am using came from Pirate Rooney." *Doug Baker* has been seriously sick in the Rutland (Vermont) Hospital. Elizabeth wrote that despite his condition his old brain "works like a computer," to quote his doctor, and his sense of humor seems to stay with him. Our best to Doug.

Sam Berke, from his Golden Guernsey Farm, Deep Lake Farm, Lakeville, Conn.: "Living on a farm, I go by the Farmer's Almanac for weather predictions and this was supposed to be the mildest of winters with a possible heavy snow in March or April. Result, on February 9th we had over 30 inches of snow. The sequence of events is usually as follows: first clear the barnyard so that the milk trucks can come in (our milk storage is limited to two days), then make provisions to remove manure. Then bring feed down from the hay sheds and then and only then do we plow out roads to move cars and bring in supplies for the people who live here. We ran out of all kinds of food and with eighty mile an hour winds it raised havoc with television towers, heat, etc. etc. Is this retirement?"

"I still am more active than ever in business because we add plant after plant and even though my physical work is at a minimum, everything has to be watched. I have taken on a bit of civic work—hospital, Arts Foundation, local paper, local school, etc., but it means only a few hours a year each and puts me high up on the donation list. So I don't have the secret of contented retirement and am happiest when I am busy and I have friends in their nineties that go to work every day; for them and for me, this seems to be the secret. But I do envy those who are happy doing very little but we can't have everything. My best to all."

Frank Boynton sent some really old black and white pictures of Allen Abrams and himself taken in Indianapolis in 1916, when they both worked for Bemis Indianapolis Bag Co. Their hats, high collars, suits with vests and high laced shoes are quite a contrast with male dress of today. *Ken Boynton*, retired, spent the winter in Florida, cool but away from the snow.

Wayne Bradley: "I have been in Florida for the past three weeks and plan to return to Connecticut March 10. I am happy to note that I avoided the major snowfalls. Along with enjoying the sunshine, I have been recruiting help for the Moosialukee Inn, as it will be necessary to replace several of my last year's employees. We are looking for a bigger and better year in New Hampshire. Some of our rubber products at the factory have been replaced by plastic and we have been working on these items for the past two years. We expect this summer to start the manufacture of vinyl siding for houses. The worst of being in business is you have to keep growing or you die."

Bill Brackett: "I designed and built a new House in Duxbury last year and moved down from Wellesley. The contractor was a grandson of a cousin of mine who lived in Plympton, sort of 'close Corporation.' I see *Larry Bailey* often at the Post Office or doing shopping at the A & P. He looks as good as ever and as spritely. *Ray Delano's* son Bob did some surveying for me, making a

contour map of the lot. My son Dick, with his four kids, lives in Duxbury, also. We only have three and two-thirds Great-grandchildren. The 'two-thirds' one becomes a whole in two months. The Old Man is still travelling New England, but not to the extent he did a couple of years ago, only two accounts now. One is the Electric Machinery Mfg. Co., and the other a Paper Mill Machinery outfit, Murray Machinery, Inc., of Wausau, Wisc.

"I have been out of circulation for a month, with the Docs trying to determine the location of a low grade infection. They took about 30 X-rays with no results. They also did the Sigmoidoscopy and during that I told them to stop, and I would 'sign the confession.' I guess I will be circulating a bit in a couple of weeks. We only got about 3 inches of snow in Duxbury in the last weekend storm. I talked with some people in Rumford, Maine and they got 24 inches. The Oxford Paper Co., where Ted Spear used to be, is one of my good customers for Barking Drums, etc."

Maurice Brandt's check was dated February 14, and he wrote: "Note the date—this is a Valentine for The Secretary Supreme." Orton Camp: "For your wonderful column, I retired from Platt Bros., last spring, but keep comfortably busy with one or two local affairs in which I am interested."

A splendid letter came from Jerry Coldwell and you wonder what he does with his spare time. "I don't see how you do as well as you do—which is excellent—on that amount of money. My activities can be summed up in a general statement to the effect that they haven't changed to any great extent. I am still on the Board of Trustees, Secretary, member of the Executive Committee and Chairman of the Building Committee of The Roosevelt Hospital in New York City and spend a day or two a week on its activities. A hospital is continuously changing physically, the result of changes in technique and in the art itself, variations in emphasis on different aspects of medical care and just plain progress. In some buildings we always seem to be tearing out a floor or a part thereof and now and then a new building is projected. Early this year we expect to start work on a new Research Building which will be located across 58th St. (South side), our present solid block being bounded by 9th and 10th Avenues and 58th and 59th Streets. It is budgeted at \$9 million and will house expanded research activities as well as consolidate those now located all over our block. Later this year we expect to start construction across 10th Avenue (West side) of a building to house nurses, interns and residents and which will have three floors of garages. Presently the rough estimate for this job is \$10 million. In the next five years we expect to demolish everything on the West third of our base block and extend the hospital in that direction utilizing that entire area. The 'guestimate' on this job is \$45 to \$50 million and it will increase our bed capacity from

its present 600 to about 700 and greatly increase the scope of our OP Department's (Out Patient) activities.

"In addition to the hospital work I attend a number of technical, business and political meetings in New York City. Had a 'Day with Mayor Lindsay' with the Tech Club of New York a couple of weeks ago and found that quite instructive. Had planned to attend a seminar covering a two day course on tabulating equipment but after I had enrolled, another date was set on a project I was scheduled for, which up to that time had been with an open date so I had to cancel the seminar. The new date covered a trip to the Thule and Sondrestrom Air Force bases in Greenland which is now set for March 10 to 13.

"It was set up by the Defense Department for a defense group to which I belong but it is not a junket; we spend our own money. The trip should be enlightening but it will be rugged. I've been on many of this kind of affair and they always are. You do two day's work each day and all is arranged except sleeping time: you get that on the plane if you are lucky. We usually get a C130 with bucket seats which is a far cry from a 707 or DC 8. As a result of many trips such as the above, I have a high regard for our domestic and foreign bases (particularly the latter) both as to personnel and equipment. Our military people know what they have to do and are capable of doing it if they are given the necessary clearances.

"As you may know, in November 1967 Verta was rushed to the Lawrence Hospital here in Bronxville for an emergency abdominal operation but has recovered quite well from that. However, she was in The Roosevelt Hospital for five weeks in October and November last year with a pinched sciatic nerve and couldn't walk. They decided not to operate and she is gradually getting better but has a lot of pain. Under the circumstances we did not get to Naples, Fla., last year or this year. Between hospitals, last August we spent a couple of weeks at the Basin Harbor Club, Vergennes, Vt., which is on the Eastern shore of Lake Champlain. It was an enjoyable stay and quiet which is what we wanted at that time.

"My own health continues good as does that of our children and grandchildren, of which there are 11 adding up Vert's and mine. My older son Bill is still selling time on TV and lives in Chappaqua, N.Y. He is married and has four boys ranging from 15 down to 5 years of age. My younger son Bob is with an American firm doing management consulting in the United States and abroad. He has been on jobs in Saudi Arabia, England, Ireland, Lebanon and South Africa (Johannesburg). Probably I forgot a few, oh yes he was in East Pakistan for several months. Right now he is on a job in Massachusetts fighting a little more snow than we had here and we had plenty—18 inches. Bob lives in New York City

and gets down every week end; in fact he had dinner with us last Friday evening. Incidentally, he is not married and seems to like 'playing the field.' This turned out to be a lot longer than I intended it to be; it should keep you quiet for a long period of time but from experience I doubt that it will! Our best to you and Frances: we hope that things are going a bit better than they were at one time."

Alton Cook: "Finally I have partially retired after 35 years with the Arkansas Co. I go in two or three days a week and take care of patent and trademark matters. I also supervise technical reports such as our product bulletins etc. This gives me more time to visit my daughter in California and my son in Maryland. I like it so far and since I am in excellent health (knock wood!) will probably continue this schedule for another year or so. I am still living alone but am considering the idea of getting 'hitched' again in my old age! Best regards." A brave and ambitious guy!

Henry Daley: "Other than flu attacks, Fran and I have survived the winter without any serious health attacks. I hope to see you at the New York dinner in April and we expect to be at Alumni Day." Jack Dalton, from Winter Park, Fla., where we hope he saw the Red Sox training for another "Impossible Dream": "We just got away in time to miss the big snow storm and expect to stay here until April, 1. It seems a bit cowardly to duck out and leave you to face winter in all its fury, but we justify it on the basis of advancing years." Ah, me! Another sufferer.

Harvey Daniels: "My news has been on an even keel for some years—Minnesota in the summer months and Del Ray, Fla., the rest of the time. With kind regards." And, after these letters, I'm looking towards the Charles River over three to four feet of snow and ice! Ellis Ellicott: "I am glad to get your letter. Emily and I are taking off for a 'Safari' in East Africa. We return in mid-March unless we get eaten up." Deoch Fulton (From whom we haven't heard in a long time): "Thanks for the reminder and congratulations on your Class Notes. They are the first thing I read in the Review. I've retired, twice, first at 65 and again at 67. After working in New York as an editor and library and college administrator, I'm living quietly in an old house on the coast of down east Maine. Two six-foot-plus grandsons."

John Gallagher: "My sincere appreciation increases year by year for your service to 1915." (Thank you, John).

Loring Hall: "Not much to report, except that we now have two great-grandsons. One, aged 5, plays chess with me. He's an aggressive player, but hasn't beaten me yet. Due to United Carr and Elox having been swallowed up by TRW Inc., and Colt Industries respectively, my business activities were reduced, so I have started a little company of my own, called Lawn-a-Mat. It is a franchise operation,

helping homeowners to have better lawns. One man, with a tractor—pulled patented machine—perforates, seeds, fertilizes, de-bugs, de-weeds and rolls, all in one operation, four times a year, for 3¢ a square foot. I have two young associates who will own the business in a couple of years, after which I'll have to look around again.

"Ruth and I recently returned from St. Croix, where we played golf at beautiful Fountain Valley, swam in the clear, warm water, and enjoyed the excellent meals at the Buccaneer Hotel. I learned to drive on the left side of the road and was surprised how easy it was to get used to it, even on the narrow, winding roads. Next month we take our regular winter vacation at the 'Wigwam' in Arizona, then back to 'work.' Are there any 1915 men in Phoenix? I enjoy reading your notes. I seem to be the only 1915 man in these parts, but you keep me up to date." What a pleasant life he leads.

Otto Hilbert is recovering from some recent cardiac trouble and we're all glad he's better. "Thanks for your letter. I am doing very well and just itching to get out and do a little more than just read and write some reports. We have had few days this year with temperatures above freezing and since cold winds are not best for me that has kept me indoors. We plan to join some Texas and California friends on a South Sea Island tour after middle of April, taking in the Rotary International Convention in Honolulu at the end of May."

Seward Highley: "Helen and I are reasonably well and happy in the same old deep, wide rut. We have 3 children and 11 grandchildren." Dave Hughes: "I think you are right—it's easier to collect \$5 every two years instead of half that amount every year." Thank you, Dave. Ben Lapp with Soph are enjoying their retirement travelling. Their son, Dr. Marshall Lapp, a physicist in the Optical Physics Branch of the Research and Development Center, has been awarded a British Science Research Council fellowship to do post-doctoral work in physics at the University of Newcastle upon Tyne, England.

Marshall will take a year's sabbatical from the Research and Development Center to assume the post of Science Research Council Senior Visiting Fellow in the University's School of Physics, Department of Atomic Physics. The research to be undertaken by Marshall involved the development and use of a technique for optically measuring atomic species number density and spectral line damping parameters. This work has relevance to G.E.'s interest in sensitive density measurement techniques for plasmas and high speed gas flows, and will contribute to the data concerning the forces which act between atoms or molecules.

Henry Leeb should get in touch with Sam Berke, another Guernsey fancier.

"I've nothing noteworthy to report. A wife, one daughter, four granddaughters and about 50 Guernseys. Planning to take our two eldest granddaughters to Europe this June on QE-2 if she gets going by then, so won't be up for Alumni Day."

Far away in the South Pacific at Zamboanga, Ernie Loveland writes: "I don't know how much longer I'll be on this job in the Philippines. There is a bare possibility when it's finished I may be sent to the Gilberts or Carolinas or perhaps South America. Or maybe I'll be wandering westward back home."

"I am working long hours for the University of Hawaii studying a commercially valuable sea weed. My oldest granddaughter, majoring in mathematics, graduated from Cornell with a Phi Beta Kappa and got her master's in math from Harvard." Smart children these.

Alumni Fund

Ben Neal is doing a monumental job, as Class Agent, for the Alumni Fund. His efficient Secretary, Joyce Bardo, is a great help. He thoroughly enjoys doing it and is particularly well pleased with the answers you fellows write him for his thank you letters. Ben writes: "While a note from me is perhaps not necessary, I do enjoy very much letting the fellas of '15 know how much I appreciate their contributions to the 1969 Alumni Fund. I didn't anticipate that I would get very many replies from the thank you notes I have been writing, the last of which are going out today. But, the answers is where the kick comes in, I, of course, have no idea how many letters I will get, but if some of them require replies, it will be nice to keep Joyce busy. Again I say this gang apparently loves to be written to."

Later, he wrote me again and it is unusual that there is no snow up in that traditional snow belt where he lives. "Been thinking of you in the last ten days, as I would have loved to have seen you digging out of those snowstorms, but am sure it probably worked out pretty well, because your profanity was no doubt hot enough to melt a good deal of it away. Have you been able to put your hip boots in storage? Strangely, after seeing so much snow in New England we have virtually no snow on the ground. So far we are just not in the snow belt in Niagara County."

Boots Malone from Sarasota: "We have been here since middle of November, a cold (for Florida) winter, but since everything is relative we have been lucky. There was a 5 inch tidal wave Sunday which flooded the keys (only a few feet above high water). We are fortunately about 12 to 15 inches above so it didn't hurt us. But did it rain! Best to you both."

Our sympathy goes to Bill Mellema, whose wife Pearl passed away February 18, in La Canada, California.

Bob Mitchell: "Happy Valentine's day, or somp'n. My present daily life, while very satisfactory to me, does not make an exciting narrative. I live out-of-doors largely, making up for too many years spent breathing noxious fumes in chemical labs and plants. Out-of-doors I have a large vegetable garden (and Anne has a flower garden). I am fortunate in having a good bit of fertile soil (old groveland) and get good crops, as good as I ever had up north. Also have a few citrus trees. Their fruit, nourished by my own sweat, always tastes better than any I can buy, but are probably the most expensive grown here. And we have a 'camper' with a car-top boat with which we explore the off-the-beaten-path areas of Florida from Key West to Pensacola. There are many many beautiful ones, and many rivers to run.

"Of course there are golf, fishing, swimming and bridge to social friends from the north who have retired here, to visit with. By June 20th my crops are all harvested, the freezer full, and we fly north to visit our families (5), with 18 grandchildren, scattered from N. Y. (Ithaca) to British Columbia. We spend two months at this, then take a travel trip for two months (this year Hawaii and Japan) and then back home to get the fall planting done and repeat the above routine. Intellectually we are perhaps retrograde, but we do read a book now and then (on rainy days), and even though our minds may be deteriorating we are having a lot of fun. Don't you ever come to Florida any more?" I used to see Bob in Clearwater.

Deceased

Our dues mailing turned up a number of deaths, for which we had had no record or notice. David F. Condrick, Bay Pines, Fla., no date. Harold E. Hadley, Worcester, Mass., June 26, 1967. Dr. John S. Howkins, Savannah, Ga. Lovell W. Mason, Milford, N.H., May, 1968. Jewett B. Newton, Auburn, Maine, January 30, 1969. Edward P. Turner, Jr., Birmingham, Mich., no date. Warren C. Whitman, Winchester, Mass., May 18, 1968. Our sympathies to the families of these deceased men.

Pay your class dues. See you at the Class Cocktail Party on Alumni Day, June 16.—Azel W. Mack, Secretary, 100 Memorial Drive, Cambridge, Mass. 02142

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Big news! Just what news is big news varies from one to another. Our big news may be that we have just found something we have been looking for for ages—a brightly decorated metal doormat for outside the back door. Your big news may be a safe flying return from far down in the Caribbean. But let Frank Hastie of Dowell, Md., tell what his is! "My big news," says Frank, "is that I finally have a namesake Frank B. III. After all, in maybe 20 or 30 years I will not be here

but no one can say I have not been here!" Further: "And the first two of my son Frank, Jr.'s children are delighting me by showing strong leanings toward auburn hair like grandfather once had. All in all, three (3) rousing cheers!"

We have a trail of news-bits from over the border and all across the country as we collate our mail for this issue. From Mexico City comes word from good old reliable *Jack Camp*, with a story or two about this and that—good fare for fireplace reading in Cottage G at our 53rd Reunion in Chatham, Cape Cod, come June 13 to 15. From up in Newport Beach, Calif., we have a message or two from *Irv* and *Kay McDaniel*—they have just been down in Ensenada, Baja, Calif., for sunshine and such. Speaking of the downpours in California *Irv* says, "The damage that the rains have done is really terrific, and very hard to visualize. You can insure anything with Lloyds of England but usually the costs are prohibitive. In California, there is no insurance for mud slides or for earthquakes. When we had the ranch we had no protection. Lloyd's earthquake premium was about 33 per cent as we were right on a fault which would have cost us thousands a year and I imagine mud-slide insurance would have been even more expensive."

Jim Evans reports hearing from *Bob Kallejian* of Whittier, Calif., who sends a "Methodist Men—Ladies Night" circular of the East Whittier Methodist Church, showing Bob as Vice President and Program chairman. He writes that this circular is one that was sent out 10 years ago: "I started it and am keeping it going." Our congratulations, indeed!

Paul Austin keeps very active in the San Francisco office of Arthur G. McKee & Co., of Cleveland, and sends a card showing the lead smelter and the electrolytic zinc and phosphoric acid plants of the Bunker Hill Co., in Kellogg, Idaho—our first mail from Idaho for years. Paul writes: "Have just spent a day in this mine, underground in the morning, in the flotation mill in the afternoon. Didn't see any smelting or refining operations. My field of interest is to see how the tailings are used to back fill the excavations of the mine." These plants produce refined lead, silver, super-purity antimony, special high grade zinc, zinc alloys, zinc oxide, cadmium, sulphuric acid and phosphoric acid.

4 feet of water in the desert

Francis and *Gladys Stern* spent our snow-bound months in Palm Springs, Calif., and while they saw little of the "white stuff" they did get into some record precipitation. Writing on February 2, *Francis* said: "The rains you read about were beyond belief. Imagine four feet of water in the desert! Yet, one of our roads, to the Tamarisk Club, was that far under. Several golf courses (of which there are 22 in the valley) had bad damage and on my club, nine holes were playable but not in regular sequence. It is

finally becoming sunny but far too cold for usual P.S. weather." Of course, by now, the *Sterns* are back in West Hartford, for *Francis* has some kind of a date on April 1 each year with some kind of a fresh-water fishing haven.

Moving on to Tucson we find *Joel* and *Virginia Connolly* (see photo p. 112) back home from their Round-South-America cruise, with their appetites whetted for additional knowledge about vanished civilizations. Their travels included a plane-and-train-trip visit to the Inca ruins in Peru and a viewing of the mysterious large stone images on Easter Island, 2000 miles west of Chile. Now they are studying library books on the Incas' history but are finding it hard to glean much useful information "since the Incas had no written language and much of what we know about them comes from rather inadequate writings of their Spanish conquerors."

Joel says that just prior to their cruise they "saw and photographed the Phoenician ironstones at Mechanicsburg, Pa. Most of them have now been taken to a museum by Dr. Gordon of Brandeis University but some are still in Mechanicsburg. According to Pohl's *Atlantic Crossings Before Columbus*, the inscriptions are in the Phoenician alphabet of ancient times. I also revisited the site of the camp of *Leif Erikson* on Cape Cod, near our summer home. Much has been learned about this site by means of archeological investigations since I first visited it in 1951, such as identifying the spot where his ship was overhauled on the beach." Thus, 1968 was a year of further discovery for *Joel* and *Virginia*, who have been travelers, both before and since they took up residence in Taiwan for several years while *Joel* served as an expert on water and public health problems there.

Also in early February we received from Tucson, an Easter Island postcard "Rock Inscriptions, Orongo—Place once dedicated to the worship of the Manatua—bird of good omen," sent jointly by the *John Fairfields* of Troy, N.Y., and the *Joel Connollys*. The message: "We are having a mini-reunion of M.I.T. 1916 this evening in Tucson, with two members present." signed by all four and with a note by *John*: "Enjoying the beautiful artifacts that *Joel* brought from the Orient."

Nutty?

We have further word from the *Harold Millises* in Apache Junction, Ariz., where they have been (or he has been) watching the stars since November, except for a month of family-visiting in California. They now expect to come back to reality (Mountain Lakes, N.J.), leaving around mid-March. *Harold* tells of the star-watching schedule: early to bed, up many nights at 2:00 or 3:00 o'clock for a couple of hours of gazing, then back to bed until 7:00 or 7:30. The "seeing" he says, "is of a quality and quantity that I haven't seen in New Jersey—some nights, so many stars, it is hard to dis-

tinguish the constellations. But most people are not interested in looking at little clouds, clumps of stars and blotches of light. One must be to a certain extent—but not too much—nutty." Well, *Harold*, if you say so!

Coming east, *Ralph Spengler* of Cleveland admits having his first birthday beyond the 70's for which we offer congratulations. Says he has recently heard from *Allen Pettee* and *Harold Proctor*, '17—it has been a couple of years since hearing from *Allen* and this is the first time since graduation from *Harold*.

A little further east, in Leetsdale, Pa., we find *Frank Darlington* who gives us some interesting answers to our questionnaire letter. What doing: "Trying to get my bills paid, and keep my pre-M.I.T. alma mater (Princeton) from coeducation!" Where been: "Hyannis Port last summer (June through October) as usual. This is our planned summer vacation. La Boss and I inveterate stay-at-homes. Did all our foreign travel—Bermuda, England, France, Italy and Switzerland—in the 20's and 30's, 40's and 50's, so Leetsdale and Hyannis Port furnish all the comfort we insist on all the variety we want." Who've seen: "Sorry, have seen no M.I.T. men lately." Children, etc., doing: "Oldest daughter dealing (with her husband) in woolen fabrics and antiques in Port Chester, N.Y. Second daughter and family residing in Hyannis Port—raising three children who are in training to dissent later on in college. Son is a Senior Editorial Assistant on *Newsweek Magazine* and is keeping his finger on the pulse of the world." Bit of philosophy: "Hope Nixon can do what Eisenhower couldn't: give the country a sound dollar, pure water and air, and to the hippies, yuppies and all other minority groups something to strive for without turmoil and give the Commies nothing at all."

Now down into the south and a step-by-step trip back from there. First, in Monroe, La., we are glad to hear that *Everett Johnson* has been doing what he considers "unexpectedly well" since his hospitalization in the earlier part of 1968. Says: "My brother, *Henry Adams Johnson*, '12, died on January 16 and I flew up to Memphis during a very bad spell of weather with no ill effects. Found no one had notified his class about his death so wrote the secretary of his class and received a most cordial response." *Everett* has now reassumed some of the work interrupted by his heart trouble and we are glad to note that he expects now to take up still more

From down in Naples, Fla., we have a mid-February letter from our own Mountain Lakes neighbor, *Elsa Mueser*, as she and *Ed* chose the best, or the worst, month of all to be away from our snow-bound pile-up season. Naples—that's the beauty spot that the *Frank Rosses* just moved to permanently, and sure enough, *Frank* and his wife called for *Elsa* and *Ed* in a "super sports Cadillac" and off they went for a pleasant supper together. *Elsa* says: "Still a golf champion, *Frank*

plays all the time at a very exclusive golf club—never goes a-swimming—and looks wonderful.” Further, says she: “We swim daily in the Gulf, walk miles and are kindly treated by old Mountain Lakers. Why not a vacation down here some time? The beach is a gorgeous 17 miles—fine white sand, partly silica and partly ground-up shell—also lots of pretty shells.”

From *Edmund Parsons* in Florida, we have word that he retired two years ago after 25 years of engineering work in New York. Says he now spends “six months in Islamorada, Fla., and six months in Jamestown, R.I., trying to keep body and soul together with golf, fishing, bridge and being my wife’s yard boy.”

Cy and Gyps *Guething* wrote late in February from the Belleview Biltmore in Clearwater, that they were about to start their trek home, going by way of a visit to Gyps’s old home in Huntington, W. Va.

They had had a “wonderful season” in Delray Beach. Says Cy: “While there we talked with Hildegard and *Jap Carr* to learn he is quite recovered. Had dinner with the *Don Websters* who are there for a month. Over here I called at *Dick Rowlett’s* beautiful home and spent a pleasant morning with them. They would like to come up to the Cape this June but may not be able to make it. And here at the Biltmore are the *Don Churches*, and *Dick and Louise Knowlton*, holding forth as they did at Oyster Harbors. They asked me to extend their best wishes to the class and urge all to come here to see them.”

Back northward toward Washington and we hear that *Pearl (Mrs. Bob) Wilson* is planning to take the round-South-America cruise that the *Joel Connollys* took this winter on the *Sagafjord*. She notes that *Bill* and *Helen Leach* of Austin, Texas, left Fort Lauderdale on February 20 on the *Nieuw Amsterdam* for a two week cruise in the Caribbean. And as we write, *Peb* and *Dolly Stone* are just starting to bask in the sunshine on Young’s Island, just off the shore of St. Vincent, W.I., and will see March out way down there. It is a place that they return to year after year. They were looking forward to this increased mobility, for back home in Jackson Heights, Long Island, they were unable to get their car out of the garage for weeks with the big pile-up of snow there.

No ex cathedra statements

Ned Hewins in Hampton, Va., sums things up most concisely with: What doing: “Nothing.” Where going: “Nowhere.” Who’ve seen: “Nobody.” What children, grand children and stepchildren are doing: “See below.” And Ned goes on thus: “Over the past 25 years my three children have been engaged in bringing my 12 grandchildren into the world, four per family, ages ranging from 25 down to 2. One grandson is out of college and has acquired two stepchildren—makes me a stepgreatgranddaddy. One granddaughter graduates from college in June—an art

major. (She is a work of art herself). Next two grandsons are in college—a junior and a freshman. My stepdaughter goes to college next fall and her brother two years later. But for these last two and their mother my brain would have atrophied long ago, since all the rest of my family are more than 200 miles away. There is no such thing around here as public pronouncements or *ex cathedra* statements. I have to watch my step that nothing I say contradicts these new-fangled text books or *Life*, *Look*, *Newsweek*, *Holiday*, *The New Republic*, *Saturday Review*, *Atlantic Monthly*, the *New Yorker* or the *National Geographic*.”

Merrick Monroe of Noroton, Conn., starts off with: “We plan to gather the rosebuds, etc., etc.” This opening sent us off into Bartlett’s Familiar Quotations, and, sure enough, we find it was Robert Herrick who wrote: “Gather ye rosebuds, while ye may, Old Time is still a-flying. . . .” Merrick, then: “The way we do it requires three basics—time, health and ‘munny,’ and having so far all three, we went to Europe on May 20 on a package tour that we outlined, with three plane trips, two boat trips and six motorcoach trips.” Countries visited included Holland, Switzerland, West Germany, Sweden, Norway, England, Scotland and Ireland.

Merrick notes that all these trips were arranged by their travel agent—one check, covering a bundle of tickets and all expenses until they arrived home on July 5. “We preferred this arrangement with the minimum of responsibility, rather than go it alone in strange languages, currencies, customs, etc.” The Merricks (190 Nearwater Lane, Noroton) and your secretary have one thing in common, a wonderful travel agent—if interested ask one of us. With bubbling enthusiasm, Merrick adds: “If any of the boys are interested in more detail, I would be glad to provide it.”

Conference at Plimoth Plantation

Now back into Massachusetts, we have first one of Dave Patten’s “random thoughts” from Standish House in Duxbury, this one about his fascinating Plimoth Plantation, which he showed many of us at our 50th reunion: “Plimoth Plantation—The 1968 attendance figures broke all records, with visitors to the ship, Mayflower II, and the First House close by the famous Rock, exceeding 395,000. A lesser number visited the Pilgrim Village which is expected. From September 6 through 8, the Plantation sponsored a conference of noted historians, including Dr. J. M. Bumstead, History Department, McMaster University, Hamilton, Ontario; Mr. John Hasson of Boston University; Mr. Martin B. Person of the Pilgrim Society; Mr. Ronald Ronshelm of the National Park Service; Mr. Harold Worthley, Wheaton College. A two-year intensive research study involving a contemplated 10-year growth has been completed. For those of you who visited the Plantation on our 50th, and are interested in the historic events which laid the foundation of our nation, developments will be startling, fascinating and

rare in the category of outdoor historic museums.”

Late February found *Jack Burbank* in Marstons Mills, Cape Cod, enjoying his greenhouse which then had five large pots of freesias coming into bloom. Wrote Jack: “They were potted October 12. Pansy geraniums are nicely budded for April 15 blossoms. My white camellias have bloomed through January and February. The red ones will be in full bloom about March 15. The cuttings for next summer’s geraniums (about 50) are all nicely rooted and will be put in 4-inch pots during March. I count on a half hour to an hour three times a week to keep things in shape.” And to keep further in shape, bowling gets his attention, “Tuesday and Thursday afternoons—three strings each, as a rule. . . . About 50 men in the group, mostly retired.” Jack says last September 4 was the date of their 50th wedding anniversary.

Harold Fuller reports retiring last July 1 and moving from Bryn Mawr, Pa., to 307 Highland St., in Milton, Mass. And: “Expect to settle in Salem, Mass., some time early in the summer. I have two sisters living in Marblehead. I was brought up in Salem and my wife in Lowell. She has a brother living in Arlington and a sister in Lowell so in a way we are ‘retiring home.’”

Dan Comiskey of Dover, Mass., reports a number of class contacts over the past few months, including a letter from *Frank Bucknam*, now happily retired in Auburn, Calif. He says Frank mentions several multiples of 25—the 1916 50th reunion a couple of years ago, his 75th birthday and 50th wedding anniversary both coming in 1969; he also looks forward to the 55th reunion soon. Dan goes on: “*Dana Barker* is well and healthy in Roselle, N.J.—visits some of his relatives on Cape Cod in the summers. Dr. Edwin Drew Reynolds, ’17, turned physician in his home town of Danvers, is still practicing from his office. I hope to see him within a few days. I talked to *Norman Thompson*, now retired in my home town of Dover; he tells me he still plays 18 holes of golf frequently and carries his own clubs for exercise. And I recently had a letter from *Elbridge Devine*, retired and healthy in Pelham, N.Y.” Dan forwarded to *Jim Evans* a picture from the January 17, *Boston Herald*, showing our *Bill Drummey* above the caption: “Kiwanis Club of Boston’s new president, William F. DiPesa of Milton, center, is installed by William W. Drummey, left, senior past president. Retiring president Walter J. McGauley looks on.” Finally, Dan says that he and Grace are well, stay indoors during the cold weather, “mostly, as *Ralph Fletcher* has said, fighting the establishment.”

Harry Lavine, still listed as life underwriter on Equitable Life stationery in Boston, says that “Outstanding for the Lavines and the Davises (my daughter’s children in Long Island) are the achievements of Sooz, eighteen in April, 1969. She was admitted to Mt. Holyoke last



Virginia and Joel Connolly, '16, studying coffee on the branch at Butantan Institute last December in Sao Paulo.

December on early acceptance; she qualified as a semi-finalist last November in the National Merit Award Competition; and has been notified her scholarship could not exceed the maximum which was awarded her. Where one has been is important, of course, but most important is where one is headed. My precious wife has resumed her Braille work (she does not call it work) and her art classes in oil. Her Temple activities have undergone only a slight shrinkage for she reminds me again and again that nothing is forever."

Some months back your secretary indicated that one of the things he wanted for Christmas was a three-legged milking stool, something to help in pulling weeds and dandelions from the lawn in spring and summer. When the item appeared in the February issue, *Brad Curtis* of Interlaken, N.J., sent us a letter, offering to make a stool but recommending four legs rather than three, for the "three-legged ones are inherently unstable." That's one we never thought of. We appreciate Brad's offer very much but told him that a member of our family in Wisconsin had ordered the specified stool for us, that it had already come from a well-known source in New Hampshire where good old New England furniture items of merit are made. But we had to admit a wee bit of surprise to see a little stamp mark on the under side that said "Made in Japan."

The monthly class luncheons, joint 1916-17, at the Chemists' Club, 52 E. 41 St., New York City, are held at noon on the Thursday following the first Monday of each month, except in summer. *Peb Stone* is now the '16 notifier of luncheons—*Jim Evans* has done it for years past and *Joe Barker* before that. Those at the March luncheon were *Walt Binger*, *Art Caldwell*, *Peb Stone* and *Harold Dodge*, together with '17ers *Dick Loengard* and *Dix Proctor*. A toast was drunk to *Walt Binger's* 81st birthday back in January.

Just another month now before our next reunion—the 53rd! Our good president *Ralph Fletcher* and our honorary member, *Bob O'Brien*, the best of reunion-fixers-uppers, both say the attendance prospects are very good this year. So, back to Cottage G at good old Chatham Bars

Inn, Chatham, Cape Cod for Friday, Saturday and Sunday, June 13, 15. If you have been debating whether it might be possible and now at the last minute find you can indeed come, just call *Ralph* or *Bob* at work in West Chelmsford (617-251-4031) or any one of your class officers.

Again we come to the close of current class news. Letters from *Ted Parsons* and *Dick Berger* will be reported in the next issue. Just keep your letters and cards and bits of philosophy coming in by writing a little but writing often to your willing scribes—we greatly appreciate your willing responses to our routine nudges.—*Harold F. Dodge*, Secretary, 96 Briarcliff Road, Mountain Lakes, N.J. 07046; *Leonard Stone*, Assistant Secretary, 34-16 85th St., Jackson Heights, N.Y. 11372

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In the February 23rd New York Times magazine section appeared the picture of the Apollo 11 entitled "Moon Bound" and shows Buzz Aldrin's smiling countenance. "For Neil A. Armstrong, who will command the Apollo 11 there will be little new in going to the moon. He and his crew members, Colonel Edwin E. Aldrin, Jr., U.S.A.F., the L.M. pilot and Lt. Col. Michael Collins, U.S.A.F., the command module pilot, have already been there at least 100 times, and the figure will probably double by the time their mission takes place. Practice for the Apollo missions has been going on for three years, and it seems unlikely that any human endeavor has ever been so thoroughly rehearsed. Because the L.M. can descend vertically and hover above the surface, the astronauts have had to qualify as helicopter pilots. (They were already qualified on jet aircraft). Buzz Aldrin will take up the account as the space craft enters lunar orbit. Perhaps the most military of the astronauts, who by in large seem like an easy-going bunch, he has a boxer's shoulders and he keeps them well back. But he also has a doctorate in orbital mechanics from M.I.T. When he speaks his manner is professorial. Among the astronauts he is known as Dr. Rendezvous. As the two space craft whirl around the moon in a 70

mile high orbit, he said, he and Armstrong will crawl through the joined hatches and give a preliminary check to the L.M.'s equipment. They will return, and struggle into their 183 Lb. back packs, multi-layered space suits, helmets and visors. This equipment would be a crushing burden on earth, but on the moon it weighs only a sixth as much. Because of the weightlessness and the need to do everything with great care, the two men will ready the L.M. for its flight to the surface with the slowness of a dream. Seventy feet above the surface of the moon the L.M. will hover while Armstrong and Aldrin closely study their landing zone. Then, easing back on the power the two astronauts will let the L.M. drop slowly at three feet per second. Five foot wands, like curb feelers will automatically extend downward from the L.M.'s foot plates and signal the first contact. The engine will be cut and man will have reached the moon. For at least two hours the astronauts will remain in the cabin preparing for their take off. The first man down the ladder, has not yet been announced, will immediately gather together whatever loose material from the surface comes quickly to hand and return with it to the cabin. When both men are on the surface they will take photographs, gather more rocks and then open the scientific kit. The Apollo 11 crewmen will remain on the surface between 22 and 24 hours."

The March 7th New York Times! "Astronaut takes 40-minute outing on craft's porch and climbed out on the front porch of Apollo 9's orbiting lunar module today for a view of earth at 147 miles off. The Astronaut spent about 40 minutes outside the spacecraft taking pictures and successfully testing the garments and life supporting apparatus that future astronauts will use when walking the surface of the moon. It was the first time an American astronaut had left his orbiting craft and depended solely on a back pack for his breathing oxygen, air conditioning, and communications rather than on umbilical hoses leading from the vehicle. The porch is set just below the square hatch. When men first step out onto the moon, they will go out on the porch and down a ladder extending from it." So the seeming impossible is a reality and it would seem the Apollo 11 will go



Vi and Dix Proctor, Secretary of '17, at the Annual Egg Nog and Champagne Party held last December at the Chemists' Club in New York. (From photo submitted by Harold F. Dodge, Secretary, '16.)

as scheduled come July. We salute Buzz Aldrin and son.

Louis E. Schoonmaker comments: "Spent two months in England the past summer visiting wife's relatives. Also made a tour of Scotland and Ireland." . . . *Walter G. Whitman*: "We feel just a wee bit guilty when strolling around the golf course in the noonday sun when we read of the New Year's sleet storm in Boston. Life—Scottsdale, Ariz.—is relaxed and pleasant for us both and our golfing scores are too high to count." . . . *Win Swain* from his farm in Halifax, Va., where he spends his summers as a market analyst: "Want a good tip on a growth Company?—Union Electric Steel." (Anything new on the Gramercy-Cambridge Fund?) . . . *Ralph Ross*: "Have just acquired our fourth great-grandchild and have married off two granddaughters thus increasing our potential for more."

Our reporter of note, *Ray Stevens*, wintering in Naples, Fla., reports on a visitor; *Hank Henry Stagg, Jr.*, and Mrs. Stagg visited us here in Naples on a short Florida vacation trip. He takes a month or so vacation during the year, but spaces it so as not to leave his business too long. His regimen outdoes even *Ken Bell*—ten hours a day, six days a week, short sandwich luncheon except when major customers are in town, up at six, a two mile hike with his dog; 8 a.m. or shortly thereafter at the office; Sundays—a day off, but sharing with his brother heavy duties and responsibilities in the Bridgeport Episcopal church, where changing populations provide the usual problems for large old churches. He and his brother own and run one of the two or three largest mill supply businesses in New England, with a large ready inventory of tools and related equipment for principally the mechanical industries. A large staff with involved detail and paper work resembling a government office in Washington—only it must move faster. Hank gets an hour or two off on Sunday afternoons for a bit of golf, and keeps in shape daily by exercises at the local 'Y'. His son and his nephew are in the business, but it looks as though they will be 70 before Hank retires. It was good to see him for the first time in some 40 years, and I hope we can get them to attend the 52nd reunion."

Ray Brooks, who is still recuperating reports receiving a note from Margaret Tuttle, Ed's wife. She reports Ed is holding his own and thinking well of '17ers.

Bob Erb: "Pat and I leave for East Africa safari on January 12, returning about March 1, via Rome and Athens."

Foster Harlow: "Retired from the general insurance brokerage business, September 1, 1968. No plans for travel at present. Keep busy during the growing season raising fruits, flowers and vegetables on about a half an acre of land. Principal enjoyment is associating with my children and grandchildren of whom I have two and four respectively. I am fortunate to be enjoying good health to this point and I trust all my M.I.T. friends are doing likewise."

Osgood W. Holt: "Try hard to forget all this fiddle-faddle going on in the various colleges and schools of learning today, by keeping my mind and body active in the real estate business in Claremont, California, the small city with six colleges; or trying to break 100 on the many challenging golf courses. Seems as though the mighty golf ball is getting smaller as well as the cups on the greens."

Carolena McNeill, wife of our long time secretary, residing at Avery Heights, 705 New Britain Ave., Hartford, Conn. 06106: "I am now very happy in this home for elderly men and women. Enjoyed the pictures in the 50th Reunion report that Stan Dunning sent me."

Deceased

Belatedly and regretfully we express our sympathy to our Conchita Lobdell Pearson on the death of her husband, Harold Pearson, '23, in January. Details regarding Harold appear in the Class of '23 column. Meanwhile, several of the Class have written to Conchita and Al Lunn had lunch with her at the time of the Fiesta in Mexico City.

The New York Times of February 25 listed the passing of *Thorndike Saville*, on February 24 at Gainesville, Fla., after a short illness. He was 76 years old. He was born in Malden, Mass., and was graduated From Harvard University with

the class of 1914, and as a civil engineer from Dartmouth College in 1915. He received a M.S. degree from M.I.T. in 1917. Surviving are his widow and a son Thorndike of Washington, D.C."

As of February 26, our class agents report that 1917 is on the move in this year's Alumni Fund Drive, per *Stan Dunning*. "The Fund office does not keep on sending all the mailings to those who have pledged or donated. Current mailings go only to the Class members, who so far, have not contributed. As of March 11, our record was 103 donors, versus 84 as of the same date last year. Our goal is for 152 donors and the total so far is \$52,472.00 versus \$48,136.00 which makes a fine comparison. For any of you who have not contributed yet, a special appeal is made hereby."

The 1916-17 New York March luncheon at the Chemists' Club was attended by four '16ers and '17ers Loengard and Proctor. Besides the excellent cuisine it was exceedingly interesting listening to Walt Binger, '16, with assists from Art Caldwell. Walt claims 81 years experience behind him in living.—*C. Dix Proctor*, Secretary, P.O. Box 336, Lincoln Park, N.J. 07035; *Stanley C. Dunning*, Assistant secretary, 6 Jason St., Arlington, Mass. 02174

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Remember Professor Louis Derr and his "innate cussedness of inanimate objects?" Such has been the case in the Cambridge environs. First we had a record scarcity of snow—up to the middle of February—then a succession of three terrific blizzards in three weeks. The result—the largest snow accumulation in the records of the U.S. Weather Bureau since its establishment 93 years ago and with it cancellation of school, college, and business for many days, loss of electric power, traffic snarls beyond description and all sorts of accompanying interruptions and inconvenience to the normal routine of living. Suppose, however, that nature becomes more capricious and devastating next time. What can we do about it? Shall M.I.T. devote more of its resources to meet that challenge? And indeed, will more research enable us not

only to predict the weather more accurately, but perhaps in a decade to partly control its violence?

We continue now with the second installment of our serial travelogues by *Jack Poteat and Tom Brosnahan*.

Land of the Midnight Sun

"Harstad is an important trading center situated on Hinnoy, which is Norway's largest island. We continue through narrow channels between islands and the mainland to Tromsø, the capital of North Norway, famous for fishing, whaling and seal catching. Many Polar expeditions have started from Tromsø. In the harbor there is a statue of the Arctic explorer Roald Amundsen. In 1926, he and Lincoln Ellsworth were the first men to fly over the North Pole. They landed the plane in Alaska.

"The island of Hjelmsøstøya is one of the largest bird sanctuaries in the world. As many as 200,000 sea birds breed here in May and June. They are mainly kittiwakes which are about the size of pigeons. Apparently they enjoy the climate on the seemingly barren rocks and manage to obtain enough food for survival.

"Our ship drops anchor in the bay of Skarsvåg at the North Cape. We reach the shore in a small boat and a bus takes us to the summit at an elevation of 1,000 feet. We are about 1,200 miles from the North Pole. The temperature is around 50 degrees, and it is so windy that we need both a sweater and a topcoat.

"In the far North, the temperature occasionally reaches 75 to 80 degrees in the summer. The average is in the fifties. In the winter it drops as low as 40 degrees below zero. There are vast areas of barren land with no trees as frost remains in the ground permanently, except for a few inches under the surface in the summer. Vegetation grows to a height of four or five inches providing food for reindeer.

"Kirkenes on the border of Russia is the turning point of our voyage. It is well known for its extensive deposits of iron ore. A local mill provides most of the steel used in Norway.

"A few homes have soil or turf roofs with grass growing on the top. There is a layer of birch bark over the rafters. Then soil five or six inches thick is placed over the bark. The material for such a roof is inexpensive. The turf reduces the fire hazard and provides better insulation in the cold weather.

"For many miles we ride along the Porsangerfjord, climbing successively to an elevation of several hundred feet and descending again to water level. Fjords are arms of the sea enclosing small islands or extending into the mainland for varying distances. Mountains usually line the shore, many of them rising precipitously to peaks that are snow-capped throughout the year, thus

presenting long stretches of scenic beauty.

"The fjords are much wider and deeper than most rivers. They can absorb the flow from rivers without any danger of a flood. However, an avalanche can and frequently does occur on a mountain slope carrying any homes or other buildings in its path right into the water. Since Norway is a welfare state, it fully subsidizes homeowners for the loss.

"We meet the ship again at Hammerfest, the northernmost town in the world. Our voyage continues between two large islands. On the port side, we observe the Seiland Glacier. Arriving in Tromsø late in the evening, we take the mountain lift to Fjellheisen observatory at an elevation of 1,200 feet. At the stroke of midnight the sun shines brightly. There is sufficient haze in the air to induce us to aim our cameras directly at the sun hoping for a beautifully colored picture.

"The ship makes a detour to the west of Torghatten Island so that we can obtain a clear view of a large hole in the center of a mountain. It is 175 yards long, a maximum of 115 feet high and 50 feet wide. In the far distant past it was about 350 feet lower. The pressure of a tremendous glacier raised the mountain. Action of frost, wind and waves over many centuries have eroded the granite and left the hole.

"On the return voyage we stop at Trondheim, which has a population of 120,000. A limited number of trolley cars on rails are still in use. However, it is a thriving commercial city. We attend a very fine organ recital at noon in the Nidaros Cathedral, which is the show piece of the city. Originally it was Catholic but was changed to Lutheran after the Reformation. The edifice is really two cathedrals, as there is an altar at both ends with seats facing each altar, and a wide cross aisle in the center. In the early days people were forced to become Christians under the penalty of having their hands, tongues or even their heads cut off. After leaving Trondheim, we sail through a number of fjords between islands and the mainland. There is a stretch of open sea in which we pass Cape Stad, the most westerly point of Norway. Brief stops are made at Maløy and Florø before we arrive at Bergen, terminating our cruise."

Around the World in 59 Days

"Who can adequately describe Hong Kong? The Chinese translation of Hong Kong is 'Fragrant Harbor.' Hong Kong is an island and Kowloon is on the mainland. Between them is a very busy harbor with plentiful ferries plying across the bay. Three U.S. cruisers were in the bay. There's a permanent 'floating' population of 150,000 Chinese who live out their lives on sampans and junks despite a 12 to 15 foot tide. Naturally the women of our group spent their

time gobbling up the fabulous bargains in jewels, clothing etc. And the men were using the 24 hour tailoring services. One afternoon another couple and we drove through the 'New Territories' that lie between Kowloon and the Red Chinese border. We saw duck farms, gold fish farms, rice paddies, truck farms and understood why we were warned against eating any above ground produce. An 800 year old walled town—crowded, smelly, squalid and filthy—was on the way. We paid the small fee to go inside and tried to photograph what we saw. For some distance we drove parallel to the large water main that runs from Red China into Hong Kong!

"But we must leave Hong Kong and fly to Phnom Penh, capital of Cambodia, and then on to Siem Reap, the town nearest fantastic Angkor Wat. Our hotel was directly across the front moat so we were within walking distance. Angkor Wat was brought to light in 1860, 400 years after it was deserted. It was built by an early Khmer king as his tomb. From 790 A.D. to 1423 A.D. Angkor Thom was the flourishing capitol of the Khmers. The wall of the great city of Angkor Thom encloses many temples, some of which are still in the embrace of the jungle, which until 1860 had taken over all the temples. The Khmer kingdom fell in 1432 under the onslaught of the Thais and there is substantial evidence that part of the loot was the living Royal Ballet Corps. We saw a troupe of Cambodian dancers with the Angkor Wat temple as a background. We also saw Thai dancing in Bangkok and to the unpracticed eye, there was little if any difference. Angkor Wat is a massive bulk and yet its carvings and historical friezes are delicate and beautiful. Immense sandstones were brought on bamboo rafts and piled and sculptured by true artists. And these carvings and bas reliefs picture the Khmer life of the time. Temples in Angkor Thom are historically important and as in the case of Banteay Srei, artistic gems, but Angkor Wat stuns the visitor by its bulk.

"Our hotel in Bangkok was at the river's edge and the traffic reminded us of the Rhine traffic (in volume only) we had seen in 1966. The sister of the king gave a tea for the group to which Betty went while John covered contacts with two doctors with whom we had corresponded. She reported a very lovely time especially the ceremony of feeding her fish—a pool full of (believe it or not)—cat fish! She explained that catfish had been their food supply during the Japanese occupation and so she expresses her gratitude by keeping them as pets. At Bangkok we were nearest the equator and it felt like it.

"To get to Nepal we had to fly to Calcutta where we were met at the airport by a gracious Indian woman and her son, friends of Asheville neighbors, who had told them of our coming. They drove us to our hotel and around the city next morning on our way to the airport. A dirty, unkempt city is Calcutta. Cattle roaming the streets and people sleeping

in doorways. We were glad to be on our way to Nepal where we arrived in bright sunshine and brisk air.

"We were surprised to learn that Kathmandu, capitol of Nepal, lies in a valley at an elevation of only 4500 ft. above sea level. It rarely snows there and they can raise two crops a year. The climate is salubrious and they have plenty of water for irrigation from the high snow-capped mountains on the northern rim of the country. Hippies from all over the world have discovered it! But it is so primitive. The only beast of burden is man—their religion prohibits the use of animals for burden-bearing and the people are too poor to have motor vehicles. So the roads are lined with children and grown-ups, each with a pole over the shoulder and carrying trays hanging from each end. The trays hold farm produce, baskets, pottery or anything that can be sold in the market place. And they walk as much as 5 miles to market. We were in Kathmandu the last day of a Hindu festival and we visited the very holy Pashupatinath Temple to see the milling crowds scattering marigold petals on the heads of roaming cows, bathing in the dirty river which ultimately flows into Mother Ganges, cremating the dead and crowding into the golden temple with its silver doors, then picnicking in the temple grounds. Both Hinduism and Buddhism entered Nepal from India. The Hindus accept Buddha as the 9th reincarnation of their god Vishnu and so the two religions get along well together. Kathmandu is an unbelievable medieval city, of winding streets, quaint, tottering, tiny brick houses with exquisitely carved balconies and everywhere garishly decorated Hindu and Buddhist pagodas, the former frequently with erotic figures carved under the eaves. We saw the Living Goddess in an upper window of her palace—a young girl of 10 or 11, who has to forfeit her position at puberty. Despite the primitive customs and taboos, real progress has been made since Nepal was opened to outsiders in 1955. U.S. aid is for education and agriculture with the Peace Corps members doing most of the teaching. Chinese aid is highways from the Tibet border. The majestic Himalayas are a fantastic sight when one views the sunrise as it gilds first one then another of the high peaks until the whole range glows in the sun.

"While Buddha was born in Nepal, he forsook his well-to-do family and wife and preached his first sermon at Sarnath just outside Benares in India. And yet Benares is not Buddhist—it is a Hindu Holy city where we saw sidewalk barbers shaving the faithful before their bathing in the Ganges. To drink and bathe one's body at the ghats, then to be cremated and have one's ashes tossed on the filthy bosom of Mother Ganges, is the apex of the soul's desire for a Hindu. Only in the morning can the ceremonies be observed since the sun is in the east across the river where it can be worshipped. On the road one may pass men carrying a litter with a corpse to be

cremated. The ghats stretch along the Ganges below ancient and crumbling Maharajah palaces. One spot is reserved for Moslems, one for Sikhs and even one for untouchables. Over 1000 pilgrims come daily to gain purification and merit for their next reincarnation. There are 1500 dirty temples in Benares dedicated to Siva. In one, a troupe of monkeys bounces about striking at visitors. Having seen Benares and the ghats, one wishes to leave, since it is more pleasant to think of the Ganges where it is born high in the Himalayas in the clean snow, than at Benares where humans seeking purity, pollute it."

The Alumni office notes a new address for Colonel *Lloyd Van da Linda*, Residence Bellorne, Lausanne Oncly, Switzerland and Captain *Cornelius V. S. Knox*, Apt. 6W5, 3030 Park Ave., Bridgeport, Conn. 06604.

Deceased

We note with sadness that *Loring Wirt* passed away after a long illness at the V.A. Hospital in Albany, N.Y., on March 5, 1969. He is survived by his wife and two daughters.

From the letterbox

Now to record some correspondence. I was pleased to hear from *Blanche Parsons* (formerly *Blanche Hanley*) enjoying her honeymoon in Columbia where she hopes to again see the *Pena Polos*. She reports that *Barranquilla* is flat, mostly industrial. The people are friendly, but there is more poverty than in Mexico

Here are some interesting letters from *John Abrams* and *Packy McFarland*. "In passing on to you a recent letter from our genial classmate *David 'Packy' McFarland* for timely excerpts on his vigorous retirement, I'd be remiss if I didn't indulge in a few observations anent your first column as Secretary. Rare indeed are men of the quality of mind and heart of *Alexander Magoun* whom you now succeed. We all do a little introspection when such a grand guy goes to his reward and realize, at our time of life, how mean we are, by comparison. Here in the heart of the beautiful Eastern High Sierra, semi-retirement finds me busier than ever, it seems. One job is, like yours a secretaryship, but uniquely, of an ancient and honorable society, the Bishop Creek Water Association. Beginning a hundred years ago the settlers near this picture-card mountain stream diverted its waters into scores of miles of ditches and 500 homeplaces. Today, after making our valley green, they converge into the vast watershed of the Owens River to flow by aqueduct to Los Angeles. One arm of the creek traverses our place and harbors, under our kitchen window, a big pet rainbow trout named Clayton. I belong to a tri-county technical action panel, a science society, and a historical society, with livewire members from many federal and state agencies and the nearby Cal Tech radio telescope facility. For several months. I've been working on a study of filtration by sand and leaf filters of domestic water. It took me back

to my bachelor's thesis and the struggles with the Poiseuille equation for capillary flow and an old Sweetland press. Again, looking back to the happy days with my old confrere *Sam Chamberlain*, I've been fascinated as I read the story of his eventful life in my autographed copy of the story of his *Etched in Sunlight* and say 'What a gent.' Best to you and yours and Godspeed, Max. John Abrams."

"Dear John: Several months ago I noticed some notes about you in the *Technology Review* and I intended to write you a note. As you know all retired people are so busy we never seem to get things done. I was retired June 1962, by the Atlas Powder Company after 42 years of technical work with explosives that took me to all parts of the country. In 1926-27 when they moved me to Wilmington, Del., we built a home here in West Chester about two squares from where I was born and raised. I had about two acres of ground and had a large garden and a small nursery where I raise boxwood, yews, and hemlocks. Unfortunately, we were across the street from West Chester State College and they condemned my garden of forty years for a parking lot for the students, which was quite a blow. So far, we have our home and I hope we can keep it until my time runs out. I now have to go four miles into the country for my garden where a kind friend who has a farm leases me some land. I must keep active to keep in shape.

"I note you have moved to the country and I envy you. I cannot remember that we have ever been in Bishop, but we were at Yosemite and came over Tropa Pass on our way east some years ago on our way to Reno, Nevada. As I recall the road was not too good. One of my friends from Grove City stopped by this past week. I spent many days in that section in the various limestone mines which took me through your old home town of Butler. Now the mines are all shut down and U.S. Steel gets all its flux stone from the big quarry at Rogers City, Michigan on Lake Huron.

We have a daughter living in New Canaan, Conn., who is married to a Harvard Ph.D. They have two boys and a girl. The other daughter is married to a Johns Hopkins doctor. They have one boy and two girls, all very athletic. The doctor, who went to Andover and Princeton, was an All American Lacrosse player. The son is being raised with a Lacrosse stick in his hand. As Harvard and Princeton were two of my pet peeves, you see what my daughters did to me. However, we feel especially fortunate that we have two fine sons-in-law.

"We just returned from two weeks at Stowe, Vermont, where the foliage is beautiful this time of year (letter dated in October). We met several people from California who had flown east to enjoy New England. One man was a retired Cal Tech man who knew an old friend, A. A. Noyes of Phys. Chem. fame.

"I saw *Dick Wilkins* a year or more ago at Summerville, S.C. where he has retired. He was a Vice President of Revere Copper Co. I hear from *Jim Todd* every Christmas. He is in Nashville, Tenn. I threaten to go to see him, but never seem to get down that way. I saw *Ed Rossman* in Paris, Maine, within the past few years. He was with G.M. for many years in Dayton, Ohio. I stopped to see *Harold Weber*, a retired Chemical Engineer professor at Mason, N.H., about a year ago. He has restored an 18th century Colonial home that is a dream.

"I have never forgotten *Bill Ryan* who was one of the best. I was so sad that one with such promise only lived to be 34. I know he had much to live for.

"We are quite interested in antique furniture and go to the Williamsburg Forum each January. We meet so many interesting people there and hear some interesting lectures. *Sam Chamberlain* of our class is generally there. He has just published a new book that my wife is giving me for Christmas.

"My brother J. B. McFarland, '22, is now living retired in Sebastapol, Calif. I should get out to see him and when we do you may get a call so we can talk over old times. Hope this finds you and your family well and enjoying life. (Packey) *David M. McFarland*."

A welcome and more recent note from our most faithful *Mal Baber* follows: "Just a line to let you know I am still alive. I regret that there is little of interest to report. We are hard at work in the most frustrating tax rush I have met in my nearly 36 years of public accounting. The I.R.S. keeps on proliferating cumbersome, time consuming, and obscure forms and this year has concentrated on the little fellow.

"Looking ahead—our 55th will slowly be coming around and I want personally to get off to a head start. Therefore, I am enclosing a small check for our class funds either to help out those whose finances do not permit attendance or to stock the bar, or any other purpose to make the reunion another wonderful affair. It is of course apart from any contribution to the Alumni Fund.

"While we haven't had the snow, you apparently are getting it in Boston. We have had quite enough to make a nasty winter. In spite of being well within the City boundaries, we have our usual menagerie, squirrels, chipmunks, rabbits and an occasional racoon. Bird feeding usually helps the starlings and the crows, also the pigeons. The blue jay, the cardinals and the chickadees never seem to get any. Incidentally, if you get down this way, give me a call. Will be happy to make your stay pleasant (the you is plural—your wife is included). So best wishes to you both."

Dorothy and *Ed Rossman* paused in Boston over night with their son and family,

en route to California via Buffalo and Arizona. They will be gone a little over two months, but expect to be back here in time for Alumni Weekend in June. I wish more of you would follow their example, and at least call me on the phone for a chat. The door is always open at 87 Ivy Street.

I wish to acknowledge some excellent photographs taken at Wianno, courtesy of Ned Longley. Many thanks, Ned.

Go and do likewise

At the risk of seeming unmodesty, but really to impress upon you that I ask no more of you than I do of myself, I submit herewith my mundane autobiography. I expect you to go and do likewise and send them post-haste to me.

Born in Stoughton, Mass., and having passed most of my youth in Lexington, I can remember vividly my happy years as a commuting undergraduate. *Charlie Watt* and I walked every day in good weather or bad from North Station to Copley Square or from East Cambridge to the new M.I.T. Great Court. Occasionally, when the Charles River froze, we walked over it, in one instance it resulted in frozen ears—a most painful experience. The ride on the train gave us an extra study period.

Plucked out of the senior year by World War I, I found myself in the Chemical Warfare Service making mustard gas. Discharged within the year, I was pushed from pillar to post during the next three years at a then fancy salary of twenty five dollars a week. You will recall that then the advertisements in the newspapers were from us seeking jobs, not like now with whole editions begging you to go to work at \$10,000.00 per year and up, and all fringe benefits.

Finally, in 1921, I became engineer for a new concern in the domestic oil heating business in Boston. Seven years thereafter I went into business for myself in this field, two years later the great depression arrived. The next year, Selma and I were married in spite of it, and here we are living together happily ever after. The business survived the depression and World War II, we are now well established as heating engineers and contractors serving apartment houses, hotels, and industrial establishments.

Like all M.I.T. graduates, I have had outside activities. I helped organize the Massachusetts Oil Heating Association, served as its secretary and then the president. I was interested, and still am, in my religious affiliation and prize my election as an honorary director of the Temple Israel Brotherhood. I am also a director of the Jewish Vocational Service of the Combined Jewish Philanthropies of Boston. I have a particular interest in Technion, the M.I.T. of Israel, and have served happily as a sort of bridge between them and M.I.T. When I was president of its Boston Chapter, a drive was completed to

raise funds for the Compton School of Chemistry in Haifa, Israel which we named in honor of Karl Compton because of his interest in the Technion. I treasure as one of my happy moments the privilege of turning the keys of the building over to Technion in May 1964.

As time went on, our interests broadened (as well as my girth) Selma had her hobbies of music and art—and some has rubbed off on me. Fortunately, we have been able to visit Europe and Israel six times. We had much pleasure on one of these trips in helping to organize the M.I.T. Club of Israel. A year ago we were in Mexico—and enjoyed in particular the Mexican Fiesta sponsored by the M.I.T. Club for Mexico. I recommend that each of you take advantage of this event if you possibly can. Another exciting hobby has been the M.I.T. Alumni Seminars in which we have participated annually for the past six years. They are educational and stimulating. I recommend them most highly to you.

I remember the 10th reunion in Weekapog, Westerly, R.I., where *Gretchen Palmer* ignited a Roman Candle on the beach, but instead of shooting vertically it went horizontally, and chased Gretchen at a furious pace! During the thirties (depression) and World War II years, the problems at hand were immediate and I confess M.I.T. was neglected. Then in the mid-forties, I started to interest myself more actively in M.I.T. affairs. At first it was a solo performance—Selma did not want to intrude, and besides "who would she know?" But I persisted, and finally I got her to our thirtieth at North Scituate. To her amazement, she found the atmosphere warm and enjoyable—and with the ice broken (and how) some of our closest friendships are with our '18 men and their wives.

One of the stimulating experiences I have had is that of being your representative on the M.I.T. Alumni Council. This association had been most exciting in opening my eyes to the many new and innovative fields of the expanding M.I.T. program. It also has put me in closer contact with you, my classmates—and that phase of this service has been a most rewarding experience.

As time goes on—and I indulge in the luxury with my many years of pondering and observing—my interest in M.I.T. becomes deeper. As *Alexander Magoun* would have put it—the Lord made man little lower than the angels and to have dominion over all things. But there was a second admonition—to create order out of chaos—to build constructively and not to destroy. M.I.T. is serving mankind—by doing research to find the truth—and to apply these truths for man's benefit. Since our graduation, M.I.T. methods have been extended from science and engineering to political economy, physiology, nutrition, urban problems, and many other fields.

Occasionally—like other members of the Establishment, I do not see eye to eye with some students, some faculty, and some of the administration at M.I.T.

I recall within this month a conversation with one classmate re a projected one day stoppage of all research at M.I.T. by a group concerned with the consequences of work being done for the military or war purposes. He was incensed at the idea. It turned out that about one tenth of the M.I.T. population held discussion groups instead of working on that day, the balance stayed on the job. They in turn were split into groups, one out of sympathy to the protest, and the second willing to listen to the protestors, but after working hours. But there was no violence. All this I believe to be proper, as long as both the proponents and opponents can present their views without intimidation or violence. This is the democratic way and I like it. All of which is a way of saying I am proud to be part of the M.I.T. family.—*Max Seltzer*, Secretary, 18 Ivy St., Brookline, Mass. 02146

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A note from *Amos Prescott* contains the good news that he and his wife are planning to attend the reunion. They have moved to the country since his retirement—66 Brush Hill Road, Smoke Rise, Butler, N.J.—and now are settled in a new house, the first move in 47 years. They spend the summers in Maine.

Deceased

I regret to report the deaths of the following: *Frederick W. Griebel*, of Arlington, Mass., on March 20, 1968; *Raymond G. Lefean*, of Pittsburgh, Pa., on September 6, 1968; and *Edgar H. Lawton* of Hartsville, S.C., on January 6, 1968.

Letters

Dean Webster spent the month of March in California. *Don Kitchin* sent Dean Webster a newsy letter, unfortunately not all good news. Both Don and his wife were ill in 1968, but both are better now. Don, who loved fast walking, found he had high blood pressure and angina. After losing 25 pounds he feels fine, and for relaxation is reading *Herodotus* in Greek. He has finished *Demosthenes on the Crown* in Greek for the 12th time. Says he likes that and Bach. Evelyn had a bad heart attack in November—finally was able to get downstairs the end of December. Unfortunately, they won't be able to make the reunion.

Will Langille writes that we are inviting widows of members of the Class to attend our reunion in June. The jackets for reunion are being manufactured and should arrive in plenty of time. This is the last "tolling of the bell" for our class to sign up for our 50-year reunion, June 12-16 at Cambridge and Chatham. We meet at McCormack Hall, Cambridge, Thursday, June 12, 5:30 p.m., for an informal reception and buffet dinner.

Then we attend commencement exercises and lunch on Friday, June 13, before we leave for Chatham Bars Inn at Chatham on Cape Cod. The rest of Friday, Saturday and most of Sunday will be at Chatham, with the Saturday night banquet in honor of President and Mrs. Johnson. On Monday our class gift to M.I.T. will be presented at luncheon, with dinner at Rockwell Cage, followed by entertainment at nearby Kresge Auditorium. The party rings off at breakfast Tuesday morning at McCormack Hall. We are assured of a good crowd, so be sure to join us.—*Eugene R. Smoley*, Secretary, 30 School Lane, Scarsdale, N.Y. 10583

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We are exceedingly sorry to report the death of one of our most popular and respected classmates, *Dan Lord*.

Dan, who lived at 9 Pilgrim Road, Marblehead, had been in ill health for some time. For many years he was superintendent of J. S. Barnett and Sons Leather Co., in Lynn and was a nationally known expert on leather for the U.S. State Department under whose auspices he visited Israel, Brazil and Yugoslavia. He was the first honorary member of the Leather Chemists and Technicians Associations of Israel, was director of leather research at M.I.T. for five years, a Fellow in the American Association for the Advancement of Science, a member of the advisory commission of Leather Engineers at Lowell Technological Institute and past president of the North Shore Tanners Club. Dan leaves his wife, Vivian, two sons and seven grandchildren. He has many warm friends in the class and will be sorely missed. I am sure I speak for us all in extending deepest sympathy to his family.

Word has been received of the death of *Winfred C. Wilde* of Rutland, Vt., a graduate of Course IV. He leaves his wife, a son, a daughter and five grandchildren. No further details are available.

That noted author, *Johnny Rockefeller*, of Short Hills, N. J., when he isn't summing at Mantoloking, is producing more reading material. He has recently introduced his third volume titled *Money in Printing*. John is a prominent technical expert on printing. Although his first book was titled *The Poor Rockefeller* the adjective "poor" may be considered relative.

Among the many who now make their home in Florida is *John Crowley* who resides at 299 River Drive, Jupiter.

Here's hoping the Class makes a much better attendance showing this year on Alumni Day next month. This is one sure way to be duly mentioned and credited in these notes. We look forward to seeing you.—*Harold Bugbee*, Secretary, 21 Everell Road, Winchester, Mass. 01890

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Did you make reservations for yourself and your wife for Homecoming 1969 (Alumni Day) on June 15-16? We hope so—or that you will, right away. To start the festivities, look for some of your friends Sunday evening in the dining room of the Charter House Motor Hotel on Cambridge Parkway, near the Institute, and join us for dinner.

The report on our '21 Interim Reunion in Mexico will require a little more time and your patience in waiting for a later issue of the *Review*. Wish you could have been there to enjoy the hospitality of our good friends of the M.I.T. Club of Mexico City and their lovely wives.

John W. Barriger, always in the news, predicts his Katy Railroad, now a subsidiary of Katy Industries, will return to the black, modestly, in 1969. . . . *Jack VanHorn Whipple* reports an address in the U.S., which no doubt signals his retirement from the diplomatic service. A long-time consular officer at the American Embassy, Colombo, Ceylon, he now receives mail at 927 Bienveneda, Pacific Palisades, Calif. 90722. . . . *Edward R. Chilcott*, owner of Technical Products Co., Inc., of Los Angeles, says he has moved his home from Pasadena to 1128 N. Las Palmas Ave., Los Angeles, Calif. 90038. A retirement home, Ed? . . . *Horace B. Tuttle* of the insulation contract division, Johnson Asbestos Co., Inc., West Springfield, Mass., should now be addressed at Box 216, Bloomfield, Conn. 06002. Does this indicate retirement, Tut? . . . *Edward W. Jackson* has moved from Colorado and can now be reached via Rt. 1, Box 20, Wilton, California 95693

William L. Knoepke has moved his retirement home from Ft. Lauderdale, Fla., to 203 Holland Rd., Severna Park, Md. 21146. Let us know in advance, Bill, when you plan to visit your relatives in Brielle. . . . *Herbert K. Nock* says he is still in retirement in Pompano Beach, Fla. 33062, but has a new address at Apt. 604, 710 N. Ocean Blvd. This explains why Betty and *Dug Jackson* had a tough time locating you, Herbie, on their recent trip.

Miss Ruth King, Associate Editor of the *Review*, who came to M.I.T. in 1926 as secretary to the beloved late Obie Denison, '11, then Secretary of the Alumni Association, and who has served the *Review* in many vital capacities during the last 40 years, is receiving good wishes on her retirement. For the Class '21, we wish to thank Miss King for her tremendous help to us over the years and to ask that she return on Homecoming Days to visit with her many friends.

Edward M. Eppridge, 518 Rothbury Rd., Woodbrook, Wilmington, Del. 19803, writes, "Theresa and I have just returned from a three month's trip to Seoul, Republic of Korea, where I carried out

an executive volunteer assignment for the International Executive Service Corps, 545 Madison Ave., New York, N.Y. 10022. I was asked to assist the Heung-Han Chemical Fiber Co., Ltd., manufacturers on viscose rayon and related products. I certainly recommend these voluntary assignments to any retired engineer or executive who is willing to help in underdeveloped countries. One can feel proud of having had the experience and having taken part in the accomplishment." Ed's job included the establishment of a maintenance program. A former manufacturing executive, Ed retired in 1964 after more than 42 years with DuPont, some three years of which was in foreign service. He and Theresa have a daughter who is an Ursuline nun; William is a photo-journalist, and Mary is a student.

Mary Louise and *Richmond S. Clark* have moved their home from Baytown, Texas, and can now be reached by addressing P. O. Box 1400, LaPorte, Texas 77571. Rich writes, in part, "We have been busy since the first of last July, buying property near the Houston Yacht Club in LaPorte, about fifteen miles from Baytown, working with an architect to design a house, writing a construction contract and finally breaking ground in October. Since then, we have been occupied in watching construction, making decisions on structural details, selecting windows, sliding glass doors, carpeting, hardware, determining what walls are to be papered and where painted surfaces are to be, and a thousand other things. We are looking forward to moving in during January. Besides walking regularly two miles a day, getting two hours rest in the afternoon, carrying on Coast Guard Auxiliary duties and occasional social activities, we try to use our boat once in a while, for which my cardiologist finally gave permission. I am having the time of my life with house building. Although I had very little to do with engineering the last twenty years I was with Humble Oil, there is still enough of the 'engineer' left in me for use where necessary. I have no eye for matching colors of carpeting, drapes, paint and wallpaper—that is Mary Louise's department and where she is especially talented. We get along fine, since she can't visualize anything in three dimensions from looking at blueprints.

She is the interior decorator and also had the say on the color and mixture of bricks for the exterior. I was interested only in the quality and price. Sorry we can't make Mexcio City as the altitude is out of the question for me. We both send our best to you and Maxine and wish you and others of our classmates would drop in or at least call us going through Houston on your Mexico City jaunt or any other time."

Helen and *Robert F. Miller*, 7910 Birnam Wood Dr., McLean, Va. 22101, have experienced a rather unique interval in their lives. The last three of their beautiful daughters were married during a period of three months—one of them in Mexico. Bob comments, "I suppose you would call it the end of an era, now that our one son and all five daughters are married. It has been pretty hectic these past few months, what with planning for one wedding and then getting ready to attend another. The next event of importance will be my retirement, now scheduled for the end of this February. Naturally, I'm looking forward to that with a great deal of anticipation." For the records, the youngest Miller daughter, Jean, was married August 31 to Frank Sando, who will finish his law course at William and Mary this coming June. Kathleen, who has been in Mexico City for several years and who joined us at the '21 dinner there in 1967, was married October 5 in the lovely Mexican chapel of Santo Domingo de Guzman to Abe Silverberg, president of a local bank. On November 30, Helen Jo was married to Major John Dillon, U.S. Air Force, in the chapel of Andrews Air Force Base, where he is engaged in research. The Miller's son, Bob, has recently been made assistant plant manager of the Continental Can Company plant in Maspeth, N.Y. Daughters Margaret Ann and Elizabeth Marie are married and live in the Washington area. Helen and Bob have six grandchildren.

A few days before we took off for Mexico, the Millers decided this would be a good time to visit Kathleen and her husband again. They left Washington for the '21 reunion right after a big retirement shindig given by Bob's associates in a Washington hotel. Bob isn't certain of his retirement program but indicates a con-

sulting schedule is in the works. Born in Syracuse, N.Y., he prepared for M.I.T. at what is now the Rochester Institute of Technology. At the Institute, he was active in the Aero Society, Cosmopolitan Club, Catholic Club and Corporation XV.

He was graduated with us in Course XV and became an industrial engineer with the Pfaudler Co., followed by a secretaryship in the Rochester Manufacturers' Association, where he had the interesting experience of serving on a community board under the chairmanship of the late George Eastman. For the next twenty years, he held executive engineering positions with Stevenson, Jordan and Harrison, supervising their installations of production and management systems in clients' organizations. Later, he became chief industrial engineer for the U.S. Signal Corps program of mechanization of supply operations, where he also developed operations and equipment layout for the sizeable Tobyhanna (Pa.) Supply Depot. Since 1954, he has been assistant chief of the Bureau of Research and Engineering, Post Office Department, and its director of mechanization and space utilization. He originated several cost-cutting processing procedures, both in current use and still undergoing evaluation. Recently, he participated in the organization of a Post Office advisory council comprising nationally known engineers, scientists, architects and educators. He also planned courses for the new Postal Service Institute. He has formed two Toastmaster Clubs among his associates in spare time and has been president of both. He served as chairman of the school budget and committee of his local civic association. A founding member of the Armed Forces Management Association, his other memberships include the District of Columbia Society of Professional Engineers, Operations Research Society and the Institute of Management Science. Bob has long served the Class as photo-historian.

Catharine and *Harry P. Field*, Arcadia, Apt. 1137, 1434 Punahou St., Honolulu, Hawaii 96822, sent *alohas* and added, "We had a visit from Allene and Web Gokey [Noah W. Gokey, '17, Captain, U.S.N., retired—Cac], both of our *George Gokey*. Web's description of his 50th reunion at M.I.T. sounded so in-



A. L. Harvey, '21



R. F. Miller, '21

teresting that we hope to make it to Cambridge in 1971!" These are most heartening words and we certainly look forward with a lot of pleasure to seeing Catharine and Harry again. . . . Mary and Laurence O. Buckner, 2630 Durham Rd., Haines Acres, York, Pa. 17402, write that they are very active. Buck says he has two part time consulting jobs. . . . Marty and William C. Ready, Colonel, U.S.A., retired, 1904 Flora Rd., Clearwater, Fla. 33515, say they will definitely attend our 50th Reunion but weren't to schedule the Mexico trip. . . . Still another Class officer reports being under the weather.

Class Agent and Estate Secretary Edmund G. Farrand, 5981 La Jolla Mesa Dr., La Jolla, Calif. 92037, has had sciatica. On the good side, he says his eyes are much improved. We know nothing will stay Helen and Ed from coming back to Cambridge in 1971 and we hope he will be able to withstand travel long before then. . . . Edna and Philip T. Coffin report good golfing weather at their winter quarters, 1950 Gulf Shore Blvd., Naples, Fla. 33940. They are still officially residents of Mt. Lebanon, Pa.

Arthur R. Harvey, 101 Kensington St., Middletown, Ohio 45042, retired in 1958 from the Gardner Board and Carton Co., Middletown, now a unit of Diamond International Corp. A native of Dexter, N.Y., Art attended Culver Military Academy and Cornell University, At M.I.T., he was a member of the Chemical Engineering Society and Corporation XV. He is also a member of Phi Sigma Kappa. During World War I, he was a second Lieutenant, Coast Artillery Corps, Ft. Monroe. He was graduated with us in Course XV and joined the former Gardner and Harvey Co., Middletown. He held various positions in the research division and was chief engineer and director at his retirement. He served for three years in World War II as a major in the Army Air Corps. A licensed professional engineer, he is a member of the board of trustees of both the Butler County Childrens' Home and the Butler County Humane Association. His memberships include the Detroit Yacht Club, Key Largo Anglers' Club, Brown's Run Country Club and the Antioch Shrine. He is an ardent member of a chess league. Ruth and Art's daughter, the late Mrs. John M.

Robertson, attended Smith and Northwestern. Their granddaughter, Sarah Robertson, is a student at Stephens College.

Art continues service to M.I.T. as an active member of the important Corporation Development Committee. He writes that his retirement activity is "having fun" and adds, "Ruth and I have an apartment at The Four Seasons, 333 Sunset Dr., Ft. Lauderdale, Fla. 33301, for the winter only and our permanent address is in Middletown. We have a boat, 'El Marusa,' in which we do considerable cruising in Florida, the Bahamas and on the east coast in the summer. We see Anne and Wally Adams often. He may have modestly withheld the information that he is Junior Warden in the Episcopal Church in Middletown."

Deceased

We sadly report the loss of five members of the Class of '21 and express heartfelt sympathy to their families on behalf of the entire Class.

Donald Denny James, P.O. Box 2202, Austin, Texas, 78767, died on September 14, 1968. Born in Austin in 1900 and a veteran of World War I, he was associated with us in Course XV. He also attended Yale University. He had been engaged in the security business in San Antonio and Austin with the Alamo National Co., and W. P. Fitch and Co., before heading his own company, Donald D. James, Inc. He was later associated with the Austin National Bank as vice president and investment officer for 23 years prior to his retirement in 1966. He is survived by his wife, Mrs. Donald D. James.

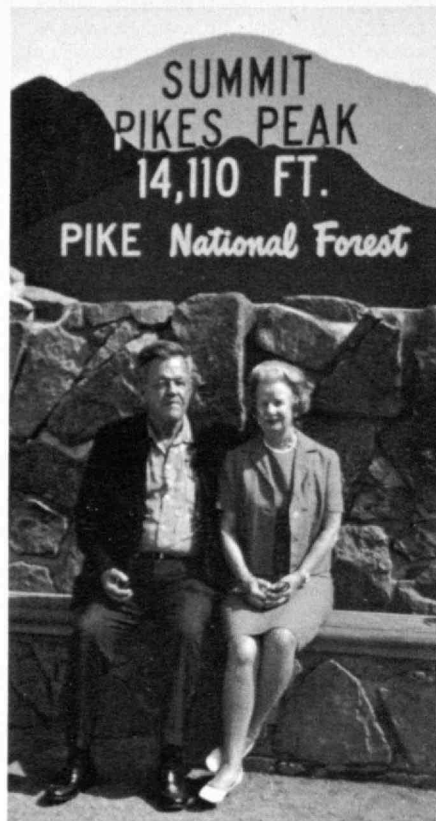
William Aronoff, 70 State St., Boston, Mass. 02109, died on September 26, 1968. He had been associated with us in Course X. For many years, he had been an attorney at law, with offices in Boston. He is survived by his wife, Mrs. Bertha M. Aronoff.

Archie Lothian Mock, 55 West Clay Park, San Francisco, Calif. 94121, died on October 29, 1968. He was born in Oakland, Calif., on July 30, 1897, and prepared at the University of California. At M.I.T., he was a member of the Cali-

fornia Club and in the cast of Tech Show 1920, "Patsy." He was graduated with us in Course XIII and had been associated with the Walter S. Leland Co., San Francisco. He retired from business activities a number of years ago. He was a member of the Society of California Pioneers. He is survived by his wife, Mrs. Renee Mock; a daughter, Miss Renita Evalyn Mock, and a sister, Miss Marjorie T. Mock, Orinda, Calif. We are indebted to Paul Page Austin, '16, 49 Park Hill Ave., San Francisco, Calif. 94101, for his kind aid in preparing these notes. Paul has written, in part, "I used to meet Archie once in a while at M.I.T. luncheons here but haven't seen him in more than fifteen years."

Harding DeCantillon Williams, P.O. Box 1354, Key West, Fla. 33040, died on November 2, 1968. Ben was born on Merritt Island, Fla., on February 26, 1896, and prepared for college at Daytona High School. He earned both the A.B. and A.M. degrees at Brown University, with Phi Beta Kappa honors. He was a member of Phi Delta Theta. Following service in World War I as a lieutenant, Coast Artillery Corps, he joined us in the junior year. At M.I.T., he was a member of the Civil Engineering Society. He was graduated with us in Course I and joined Bandy-Crowder-Williams Co., engineering and contracting firm of El Paso, Texas, becoming treasurer. He was engaged in construction projects in Cuba in connection with the building of the *Capitolio* and the *Hotel Nacional* in Havana. He later carried out other projects in Latin America in association with Creole Petroleum Corp., Caripito, Venezuela, and the Ministry of Public Works, Guayaquil, Ecuador. On his return to this country, he took part in a number of engineering projects, including the construction of the Prudential Building, Jacksonville, Fla. He retired to a home in Key West, Fla., several years ago. He was a vestryman of St. Paul's Episcopal Church, Key West.

He is survived by his wife, Mrs. Joan Williams; a son, Harding DeC. Williams, Jr., a Washington, D.C. attorney; three brothers, Ronald Stillman, Miami, Philip Stillman, Coral Gables, and Robert Stillman, Canton, Mass.; an uncle, William F. Ronald, Daytona Beach, and four grandchildren.



Madeline and Ralph Shaw, '21

Harry Marcus Myers, 57 Harvard Ave., Brookline, Mass. 02146, died on December 22, 1968. He was born in Brookline on May 5, 1900, and prepared for the Institute at Brookline High School. At M.I.T., he was a member of Zeta Beta Tau, Sigma Alpha Mu and the Chemical Engineering Society. He was graduated with us in Course X with the bachelor's degree and earned the master's degree in the same Course the following year. From 1922 to 1924, he was a member of the Institute's Chemical Engineering staff as an instructor in the Research Laboratory of Applied Chemistry. For many years, he had been treasurer of the Boston firm of S.A. and H. Myers, Inc., manufacturers of men's clothing. Upon the company's merger into the Continental Manufacturing Co., he became general manager and director of the subsidiary, retiring in 1965. Harry's hobby was photography and he made a number of picture records at '21 reunions. He had been president of the Newton High School Parent-Teachers' Association and chairman of Red Cross and Community Chest committees in Brookline. He was a member of the Watertown Yacht Club and was active in boating and the local Power Squadron. He is survived by his wife, the former Miss Mae Mann of Albany, N.Y.; two daughters, Mrs. Suzanne M. Broughton, B.A., Bryn Mawr, and M.A., Brandeis, and Miss Nancy Myers, B.A., Bryn Mawr, and M.A., Toronto, and one granddaughter. We are indebted to Mrs. Myers for her kind letter of aid in preparing these notes.

We acknowledge a card plus welcome letters and letters and beautiful stamps from **Ralph M. Shaw, Jr.**, 608 Riverbank, Beverly, N.J. 08010, with Rufe's news witticisms and downright good common sense viewpoints. Lest some of you Hexalphas wonder why Rufe's letters may carry a new address, the city fathers insisted that riverfront homes be designated by the street numbers. Rufe's driveway fronts on Warren St. Says he, "We have lived here forty years and just 'Beverly, N.J.' would find me. 'Riverbank' was a status symbol. I have always maintained that it is not where you live or what car you drive that counts—but rather what sort of man you are yourself."

A card from Naples, Fla., reports the Shaws had dinner with Edna and **Phil Coffin** at the latter's winter apartment home, 1950 Gulf Shore Blvd., Naples, Fla. 33940. Rufe followed this with a note on the stationery of the Sandy Lane Hotel: "Greetings from Barbados! It is fair and about 85°. The sea is clear, warm and transparent. All there is to do is sleep, eat, sun bathe, swim, sleep and eat. With two Planters' punches under your belt and a tropical moon upstairs, a steel band with twelve oil drums sounds like a symphony orchestra. I can cut a rug like an expert and can shag like a Third Avenue aristocrat. Here are a few Jamaica and Barbados stamps—all I can buy at the post card concession at the airport. Our best to you and Maxine."

Madeline and Rufe's Christmas card had a summery picture of them atop Pike's Peak. Rufe hasn't had time to quit his challenging work as president and chief engineer of Pedrick Tool and Machine Co., 3640 N. Lawrence St., Philadelphia, Pa. 19140, where, since 1937, he has designed and built complicated coil winders and "impossible" bending machines for leading industrial plants here and abroad. Daughter **Mary Eleanor** and grandson **Ralph Martin Shaw Scott** are living with the Shaws in Beverly.

Before you get involved in a recreational summer program of golf, boating or whatever you do for fun, won't you please take a moment to write to your secretaries and tell them about it? If you haven't written us for many years, we would especially like to hear from you now. It will serve as a grand spring tonic for you, for us and for the whole Class. Hope we see you at Homecoming in Cambridge next month.—**Carole A. Clarke**, Secretary, 608 Union Lane, Brielle, N.J. 08730; **Edwin T. Steffian**, Assistant Secretary, Steffian, Steffian & Bradley, Inc., 19 Temple Place, Boston, Mass. 02111; **Sumner Hayward**, Assistant Secretary, 224 Richards Road, Ridge-wood, N.J. 07450

22

This is a snow job! Your secretary has been saving reports of New York's Feb-

ruary 9 and 10 snow difficulties through the mighty efforts of the Erie Lackawanna trains to deliver commuters. But the file of clippings from Boston's snow is much higher. Poor old Buffalo has suffered with bare streets and 20 to 40 degree temperature. Our snow-making equipment in the ski areas worked overtime to produce usable slopes. Meanwhile, those lucky Bostonians report "one gigantic snow-in" after another keeping people "out of work, out of school, out of theatres, out of department stores and out of cars." The man on snow shoes walking to the Prudential Building (as shown in the February 27 *Christian Science Monitor*) must be an expert by now with a total snow fall of 36 inches in a month and the feeble efforts of "nearly worn-out snow removal crews." Let's not have anyone say again to your secretary, "You don't live in Buffalo, do you? How can you with all that snow?" It is now the middle of March but still we have no use for snow tires in this entire area.

We were pleased to receive a greeting from President **Howard W. Johnson** expressing his appreciation of the active support given the Alumni Association by so many. This certainly applies most emphatically to the cooperatively contributing members of the Class of 1922. The M.I.T. Fiesta in Mexico should be in full swing by now and we hope to have a complete report next month. Since your Buffalo representative will leave shortly on his Trade Mission to Czechoslovakia, Yugoslavia, Hungary, Romania, Denmark and Holland, our trip to Mexico City had to be cancelled. Maybe next year! Think of your enjoyment in the future as you read in these notes two months from now "Mission Accomplished!"

Parke and **Madeline Appel** have sent in a beautiful picture of the little church in Chichen Itza, Yucatan, Mexico with their greetings: "Dear Dorothy and Whit: We've been in New Orleans for two days. Arrived at Merida, Yucatan, Mexico in 100° temperature. We were met by Arturo Ponce Canton who has entertained us royally. We've explored the Mayan and Toltuc ruins at Uxmal and Chichen Itza. We now await Arturo who is flying to Mexico, D.F., with us tonight. We will attend Tech Fiesta and leave afterwards for Acapulco for a week, then to Florida for another week. We'll see 1922 classmates on the way."

Under the Chairmanship of **Crawford H. Greenewalt**, the first general meeting of the organizing committee for the 23rd International Congress of Pure and Applied Chemistry was held at the Academy in December. This is the first Congress to be held in the United States since 1951 and is scheduled in Boston for July 1971 featuring as major subject areas, organic chemistry and macromolecular chemistry.

David H. Harris of Wellesley Hills writes that he has retired after spending 20 years as Vice President of three companies producing electronic systems, metal specialties and fine china. He was also senior consultant with Arthur D.

Little Inc., for six years. His past two years have been devoted to work as treasurer of the local 350 bed hospital (Newton-Wellesley), travel to Europe and Hawaii to improve his golf game and learning how to relax and "putter around gracefully." He further says, "My family has grown up. One daughter graduated from Wellesley and is living in Hawaii. My son went to Rochester and Wharton School and our youngest daughter finished Connecticut College for Women in June." Dave also admits to being an avid reader of new bits about our illustrious class. Profuse thanks for the news to Dave Harris!

Hall of Fame

An induction was held in January for the California Olympic Championship crew of 1932 to the Helms Hall of Fame at the annual Rowing Awards Dinner. Also inducted at the New York dinner were three rowing patrons including *Horace W. McCurdy* of Seattle. Horace was Captain of the first M.I.T. crew that had the sponsorship of M.I.T. and was responsible for the recognition of the sport. They recognize him as "a successful engineer in Seattle, a Director of the Lockheed Aircraft Co. and retired President and Chairman of the Board of Lockheed Shipbuilding and Construction Co." He is also a Trustee of the National Rowing Foundation. The *Seattle Times* pictured Horace as a native of Port Townsend and, as a one-time student at the University of Washington, he was named their Distinguished Alumnus of the Year 1964. Jim McCurdy came East from Seattle for the event and *Don* and *Louise Carpenter* came to New York to attend a small dinner and theatre party in honor of Catherine and *Horace McCurdy*. Unfortunately the New York Airports were closed during part of this period preventing the Strattons and some of McCurdy's boat-mates from attending.

Deceased

We have received notices of losses to our Class and send appropriate sympathy to the families of: Miss *Ruth A. Thomas* of Nahant, Mass; *Metron F. Ticknor*, New Fields, N.H.; and *Irving Chernoff*, Brookline, Mass.

Among the changes of address received are those of *Paul C. Merrill*, Long Beach, Calif.; *Earnshaw Cook*, N. Charleston, S.C.; *Joseph Greenblatt*, Ft. Lauderdale, Fla.; *Edwin C. Brown*, Milwaukee, Wisc. You must excuse the rub-in of the snow-in but this factual retort brings us great happiness and satisfaction—and what else is there?—*Whitworth Ferguson*, Secretary, 333 Ellicott Street, Buffalo, N.Y. 14203; *Oscar Horovitz*, Assistant Secretary, 45 Gerard St., Boston, Mass. 02119

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We are most pleased to announce that "Pete" *Pennypacker* has joined the staff of class officers as Assistant Secretary-Treasurer. Pete is recovering nicely from a bad bout of illness which laid him low

last fall and will soon be home again at his most attractive place (Long Hill Rd., Essex, Conn. 06426). He will be custodian of the class files and will be a source of helpful advice and counsel to me as your diligent, hard-working Secretary-Treasurer. Pete's house overlooks a beautiful stretch of the Connecticut River. Doris gave Marge and me a very nice lunch after we went to visit Pete at the nearby convalescent home and later took us for a tour of this delightful unspoiled section of the Nutmeg State that is attracting so many new residents from the New York Metropolitan area. The Rounds are still looking for a smaller place for our retirement but Pete tells us that he plans to stay put where he is.

Howard Russell will shortly visit Arizona where he and Mildred may soon settle—certainly a more amenable climate than New Hampshire, in winter at least.

Roscoe H. Smith writes a joint letter to Skinner, Cornish and me as follows: "Eleanor and I had so much enjoyment with Conchita and *Harry Pearson* in a month spent with them and our Norwegian classmate (*Harold R.*) *Bjerke* and Mrs. B. on the coast of Spain in 1967, and for a week last October at our place in Maine, that because of Harry's sudden death we just don't feel in the mood for festivity as had been planned for Mexico City in March. We were expecting to visit with the Pearsons after the M.I.T. Fiesta. It was Harry who was instrumental in getting us to plan to attend. . . . You all have a wonderful time. . . . give our love to Conchita if you see her." From *Harold Pearson's* son Bruce, of Toronto, we have some biographical notes concerning his father's career. Following graduation, Harold joined the firm of Dewey and Almy Chemical Co., of Cambridge, Mass. In 1930 he moved to Canada with the Canadian subsidiary of Dewey and Almy where he worked to promote the growth of that company until his early retirement as Vice President and General Manager in 1958. In late 1958 he moved from Montreal to Toronto, forming his own company, Construction Chemicals Ltd., and in 1965, another company Canadian Consociates Ltd. He was president of both companies until his death.

Harold was active in many community affairs, serving with the Canadian War-time Prices and Trade Board during the war. He was an active Rotarian as a past president in Montreal. Also he was a past president of the Dominion Commercial Travelers Association and helped establish a chapter of Lambda Chi Alpha at McGill University.

Deceased

From *John W. Beretta* and *Martin E. Staley*, '26, we learn of the passing of *Marvin Eickenroht* of San Antonio on February 22. Marvin was a practicing architect in that city for 34 years and was honored in 1967 by his election to the grade of Fellow of the American Institute of Architects. During his career he published two historical books on early Texas architecture and was instrumental

in rehabilitating some of the early buildings in the San Antonio area. He was a member of a pioneer German family that settled in Texas about 100 years ago. John Beretta tells us: "I first met Marvin when we were both students . . . of the University of Texas . . . and enrolled in M.I.T. . . . where we were close friends during our New England as well as our Texas days. He was truly a wonderful character whom I respected greatly. . . ." Marvin and his wife attended our reunion at Bass River last June but was not in the best of health at the time. He did tell John Beretta later that he was extremely grateful for being able to attend the reunion and everlastingly thankful "for this wonderful experience." He is survived by his wife Mrs. Ann H. Eickenroht and two sons, Marvin B. Eickenroht of Houston and Edmund Y. Eickenroht of San Antonio.

We are also sorry to hear of the death of *Harry M. Chatto* of Cambridge, Mass., (1010 Massachusetts Ave.,) on December 10, 1968.

The following address changes have come to our attention: Colonel *John J. Breen*, 174 Summit Ave., Summit, N.J. 07901; *Henry F. Culver*, 702 Chanticleer Lane, Hinsdale, Ill. 60521; *Sixto E. Duran-Ballen*, Balmes 194, Barcelona, Spain; *Irving J. Kahan*, Apt. 1111-N, 10295 Collins Ave., Bal Harbor, Fla. 33154; *Joseph P. Keegan*, Apt. F-309, 5208 N.E. 24th Terrace, Ft. Lauderdale, Fla. 33308; *Paul J. Moore*, Box 127, Westerly, R.I. 02891; *Reginald H. Peene*, P.O. Box 1831, Hamilton, Bermuda; *Paul L. Wilkins*, 369 D Portsmouth Dr., Lakewood, N.J., 08701. —*Thomas E. Rounds*, Secretary-Treasurer, 25 Ridge Rd., Danbury, Conn. 06810

24

For some years now *Archie Carothers* has been leading the life of a retired gentleman of leisure at Vista Del Lago in Santa Ana, Calif. Recently he moved inland, but he certainly didn't get away from the Spanish influence. He is now living on Madrid Road in La Villa Real de la Santa Fe de San Francisco. Archie might not recognize this impressive address, however, since the short version has been in use for quite a while now—Santa Fe, New Mexico.

Henry Rau says he keeps "reasonably" busy, and that seems somewhat of an understatement since he owns some radio stations (number unknown, at least to your secretary) and a Cable TV operation in the Washington, D.C. area. He did take a few weeks off early in the year to pick up a bit of sun in Jamaica, and in the small-world department met a chap from Ottawa who was an old friend of *Dent Massey's*. Henry doesn't travel as much as he would like since his wife, unhappily, is a semi-invalid, but he will be with us at Bald Peak in June.

Also looking forward to Reunion is *Clarence Redden*. He was retired from

Scott Paper last August, but hasn't severed connections completely. "Scott has kept me fairly busy consulting on pump mill engineering." If he feels the urge to travel to far places at Uncle Sam's expense, chances are that *Paul Cardinal* and the I.E.S.C. can find just the spot for him.

Last fall the *Andrew P. Kelloggs* took off for a European tour. Have no idea of their itinerary, but in any event they got back in time for Christmas. Shortly after the first of the year they were off again, this time for a rather unexpected visit to Bermuda. The rest of their winter was spent shuttling back and forth between Toronto, the ski slopes of Stowe, and Schenectady, but by now they are undoubtedly out on their delightful farm sniffing apple blossoms and watching their tuberous begonias shoot up. The Kelloggs, too, will be with us in June.

River expert

We told you recently that Sam Shulits had retired from Penn State, but he didn't stay retired long. There probably are very few river experts running around loose, so on January 2, Sam joined the faculty of the University of New Brunswick. In between he finished off a research report for the U.S. Department of Agriculture on bedload formulas—nothing to do with mattresses, he says. "I shall remain here until at least mid-1970. After that both U.N.B. and I shall see about the future. I came here because I'm interested in river behavior, fluvial morphology, river regime, etc. One problem with which I might be associated: the stability or maintenance of salmon pools in famous salmon-fishing rivers like the Miramichi." A lot of salmon fishermen will bless his name if he does that, especially if he can assure them of full-grown salmon, not just grilse. Sam also adds a bit of gratuitous information: "Did you know that the Kennebecasis River meanders?" If meandering rivers are among your hobbies, write Sam at Fredericton, N.B., for further details.

One man who seems to get into all sorts of intriguing investigations is *Hudson Hoagland*. We told you some time back about the martini researches he was conducting at his Worcester Foundation for Experimental Biology. Now it seems he's going in for fertility. At the A.A.A.S. meeting in Dallas last December he was one of a panel (another was Margaret Mead), who went into the "Control of Fertility" in some depth. Dr. Hoagland spoke specifically on "animal populations and their mechanism of control in relation to the organization of their societies and the degree to which these matters may be relevant to human population control." As these notes are being written spring is just around the corner, and from the carryings-on of our backyard wildlife, especially squirrels, it doesn't seem as though they care a great deal about control. John Updike would like it here.

Deceased

George A. Ballentine left M.I.T. for Colgate, from which he graduated with an

A.B. and an M.B.A. For years he had been at the University of Rhode Island until his death more than a year ago. *Charles F. Daley*, a Chemical Engineering graduate, was a patent attorney for duPont for many years. When he retired he continued living in Wilmington where he died last October. Another Chemical Engineer, *William J. Frisbie Jr.*, had a varied career as metallurgist, chemist, life insurance agent, and industrial engineer. At the time of his death last December he was with the U.S. Naval Ordnance Plant in Lake Forest, Ill. *George W. Stewart*, a retired Army Colonel, had lived in Lincolnville, Maine, in recent years. Belatedly we learn of his death almost two years ago. A sombre note on which to end this column.—*Henry B. Kane*, Secretary. Box 177, Lincoln Center, Mass. 01773

25

It was most embarrassing to your secretary to have missed reporting in the class notes last month. This was partly due to the part-time schedule which I am enjoying at the present time, and in large measure due to the fact that for some unknown reason it some times takes at least a week for a piece of mail to move from the fourth floor of the M.I.T. Ford Building to the seventh floor.

Deceased

It is with deep regret that I must announce the death of *Fred Walker* who passed away on January 7, 1969 at the Middlesex Memorial Hospital in Haddam, Conn. Fred not only did his undergraduate work at M.I.T. but he obtained his Ph.D. here in organic chemistry in 1929. Most of his working life was spent as a research chemist, patent agent, and information storage and retrieval officer for the duPont Company at Perth Amboy, N.J., Niagara Falls, N.Y., and Wilmington, Del. Most of his research was in the study of formaldehyde and its properties, and he was the author of the American Chemical Society's monograph, *Formaldehyde*, which is in its third edition. The Japanese edition was published in 1960 and a pirated Russian edition in 1957. Fred was recognized for his work in formaldehyde in 1957 when he was awarded the Schoellkopf Medal by the American Chemical Society. He also authored numerous articles on the history of chemistry, chemical technology, and documentation studies, as well as formaldehyde articles for the *Encyclopedia Britannica*, the *Encyclopedia of Chemical Technology* and the *Encyclopedia of Chemistry*. He is listed in the *World Who's Who in Commerce and Industry*, *Who's Who in the East* and *American Men of Science*.

There are many things that we know little about concerning our classmates, and Fred was one of those who had many other talents. From 1951 to 1960 he served as a licensed lay reader of the Episcopal Church, diocese of Western New York, with permission to preach sermons of his own constitution and was

a published poet and amateur artist, exhibiting at Studio Group, Niagara Falls and the Art Association of Essex, Conn. He was the recipient of the James E. Reid award for oil painting, Western New York, 1959. Since his retirement in 1964, he served as a consulting chemist, technical writer and U.S. patent agent. At the time of his death, he was consulting patent reviewer for De Lio and Montgomery in New Haven, an editorial assistant and reviewer for the American Library Association's book review journal *Choice* and a lay reader and vestryman at St. Stephen's Episcopal Church in East Haddam. As many of you know, Fred was a very loyal member of the Class of 1925, provided many gifts at several of our reunions, and will be greatly missed by many at future class gatherings.

I am sorry to report two other deaths: *Stanley W. Davis*, in Rockland, Mass., on January 11, 1969, and *Frank L. Hall* at Bartonville, Vt., on November 14, 1968.

Activities and retirement

A number of items have come through in the mail in the past several weeks. *Garvin "Chink" Drew* writes from San Francisco, Calif., and he provides the following information: "Having spent much of the last few years travelling abroad, now that I am retired I felt a trip to the West Coast would be in order, visiting the places where we used to live. En route, I called *Harrison Browning* in Tucson, Ariz., visiting with him and his good wife at their palatial desert home. We had lunch at a fabulous country club, and Harrison brought us up to date on his activities. He continues in the harness running his own company, The Arizona Gear Company, assisted by his son. He also owns a condominium at Ranch Santa Fe in California and keeps his boat nearby. Coming up the coast we visited with Bud Cole, of the Class of 1927, who also runs his own plastics and rubber company. His brother Austin in our class of 1925 is President of the H & C Milling Company of Chester, Ill.

"During our stay in San Francisco, we lunched with Geoffrey Roberts who is retired here. We last saw him in Kula Lumper, Malaya, where he was managing some tin mines. Previous to that, he was doing mining in South Africa where he met his charming wife. Geoffrey started with Duquesne Power & Light, together with Charlie Boardman, and brought us up to date on Charlie who has retired. He spends much of his time studying botany, fauna in Western Pennsylvania, etc., and it appears he is quite an expert."

A published article from Denver, Colo., is headed: "Ben Oxnard Retires From Career in Sugar." I think many of the Class who know Ben would be interested in the article, and I am taking the liberty of quoting it as follows: "'Retirement from a noted career' was the merited lead on the story from the Great Western Sugar Company publicity department. But *Benjamin A. Oxnard*, to anyone who knew him, was his own best testimonial—an unaffected gentleman, a man learned

not only in his field but knowledgeable about life's purposes. Corporations just don't make men like Oxnard very often anymore. He was a senior vice president at the company and had a family background in sugar that went back 128 years. Oxnard was in charge of sugar sales for Great Western in most of his 28 years with the company.

"His family pioneered in cane sugar in this country, and had extensive sugar beet acreage in California, where a town is named Oxnard. Before he became senior vice president last January, Oxnard was vice president of sales and a member of the board of directors of Great Western Sugar. Until recently, he was also a director of Great Western United Corporation, parent firm of GW Sugar.

"Oxnard came to Great Western as general sales director in 1940 from the Savannah Sugar Refining Corporation in Georgia, where he was sales manager. While there, he revolutionized sugar marketing practices by perfecting the multi-wallpaper bag and baler to replace cloth sacks. He began his sugar career at Savannah in 1924 soon after his graduation from Massachusetts Institute of Technology. A native of New Orleans, Oxnard was married in 1926 to Miss Virginia Hitch, daughter of Robert M. Hitch, one-time mayor of Savannah. The Oxnards live in Denver at 345 Gilpin Street. His father, Benjamin, founded the Savannah sugar firm and earlier developed the old Adeline sugar plantation and mill near New Orleans. It was his three uncles—Henry, Robert and James—who formed the old American Beet Sugar Company and helped to build the sugar industry in the West. They erected Great Western's factory at Scottsbluff, Nebraska, in its original location at Ames, Nebraska. The Oxnard sugar line began with his grandfather, Thomas, who acquired a cane plantation in Louisiana in 1840 and later operated refineries in Boston and Brooklyn. The family's sugar connection continues now with Benjamin A. Oxnard, Jr., who is a vice president of the National Sugar Refining Company in New York."

A letter from *Richard P. "Tom" Price* came in from the Republic of Panama. Tom is presently serving as an executive volunteer with the International Executive Service Corps and is on a three-month paper mill project in Panama, where he is facing limitless problems. Tom has the welcome mat out at The Southampton, Delray Beach, Fla., where Sue is staying for the present; although she may spend the last few weeks with Tom in Panama. By the time this appears in print, you might find both Tom and Sue at home at Florida.

John L. Partin writes from Los Angeles, stating that he is now entering his fourth year of retirement and is finding the new way of life pleasant and rewarding. A change of address for Mr. and Mrs. *Willard C. Asbury* shows them now residing at 186 Conant St., Hillside, N.J., 07205.—*F. L. Foster*, Secretary, Room 4-144, M.I.T., Cambridge, Mass. 02139

26

Last month we talked with some enthusiasm about a wild storm that we were having and how exciting it was to witness from a cliff overlooking the seas. Little did we realize that it would be back in a few days to really clobber us. Those who have been here will recall the long drive-way but it may be difficult to envision seven foot snow drifts all the way in and twelve feet of snow in Heather's dog pen. We had to wait from Monday evening until Friday morning for a bulldozer to come and dig us out. We must add, however, that this storm had never been equalled in 98 years of record keeping by the weather bureau.

But this morning the sun is bouncing off the drifts outside providing a relaxed atmosphere for writing class notes. This is developing into a most interesting period for a class secretary because so many classmates are writing about their plans for retirement or their experiences in retirement. Lets start with a recent letter from *Dan McGrew*. "Dear George, I retired on October 1, 1967 but, contrary to your guess, I find I thoroughly enjoy loafing. My last army duty had been at Fort Bragg for nearly a year ending in late 1967, having been here a number of times before. At that time we decided this was where we probably would retire when I quit entirely, so we bought a house here in Fayetteville, N.C., in early 1967 and moved down on October 1. We like the people, the climate and the area in general. If you are ever driving to Florida, please plan to stop and see us. Best regards to you and the Class of '26, Sincerely, Dan." It appears that General Edward J. McGrew, Jr., has adjusted to retirement with the greatest of ease and grace.

The next one to report is *Bruce Powers* from Tempe, Ariz. Bruce has written a book and after letting you read his letter I'll tell you about it. "Dear George, Your remark in a recent issue of the *Technology Review* about the activity you anticipate in your impending retirement struck a responsive chord. I thought the enclosed jacket of my book recently off the press of John Wiley & Sons might provide some idea of what has kept one classmate well occupied for the last three years. Since my 'retirement' several years ago I have been busier than ever before running a small ranch (fortunately now leased) among other activities and hobbies. However, I intend to take an enforced breather starting this June when my wife, Doris, who is a professor of English at Arizona State University, has a sabbatical coming up. We plan a trip to the U.S.S.R. and other countries in that area, ending up in England some time in the fall where Doris plans several months of research for another book in her field. And if I can fan the flame of inspiration, I will probably spend some time investigating modern Soviet literature. So from my point of view, retirement has not meant a rest, but a refreshing change in direction of activities." You

would never guess the title of Bruce's book, *Dictionary of Irregular Russian Verbs* unless you knew that after graduating from the Institute, Bruce went on to Arizona State for a B.A. in Russian and since his retirement as a Colonel, Corps of Engineers, he undertook formal study of the Russian language. Who can top this for an unusual retirement activity?

A letter from *Eben Haskell* doesn't mention anything about retirement plans but it gives us some ideas. "Dear George, The recent announcement of the 1969 Fiesta in Mexico City has inspired me to write as I intended after our return from the 1968 Fiesta. We met *Chet Buckley* and his wife who were at their first Fiesta. This was our second (having had such an enjoyable time in 1967 when *Dave Shepard* and his wife were the only other '26ers, we decided to repeat in 1968). Chet suggested that we should start a campaign to have some '26 reunions at Mexico City between the 5 year Cambridge reunions, as the class of '21 has done quite successfully. Chet and I agreed to talk it up but have done nothing about it since. After the Fiesta last March we, somewhat on the spur of the moment, purchased two tickets for the *Ballet Folklorico*. After being seated my wife began conversation with the women next to her finding out they were from Easton, Conn., which is only about 25 miles from our home town. Just as this was being said I began to pay attention, and lo and behold, there was our classmate, *Chick Merritt*. He retired a few years ago from Dictaphone Corp., in Bridgeport and is presently living on Orchard Lane, R.D.1, Fairfield, Conn. Chick had not been at the Fiesta but was on a vacation trip to Mexico and asked if we were going to Guadalajara, suggesting, 'why don't you look up Nowlen who has a house at Lake Ajijic.' He, of course, was referring to *Gene Nowlen* whom I had not seen since 1926. Gene, Chick and I were all $\Sigma\Delta$ fraternity brothers. Later we drove to Ajijic and had a very pleasant visit with Mr. & Mrs. Nowlen who had rented a very charming home for a year. We found Ajijic a most fascinating place and recommend it to anyone who likes something different. Gene is a retired architect and a well known painter and obviously found much material for his brushes. This Christmas a card informed us that the Nowlens are now back at their home at Laguna Beach, Calif."

One more note on the back of an envelope from Brigadier General *Ernest K. Warburton*, retired, "Dear George, Retired in 1960 after 34 years with the U.S.A.F. About half my service was spent away from home in all parts of the world. Now settled on 100 acre homestead in central Massachusetts. Five married children and two boys in college. Only problem is not enough time to do what I want to do. Ernie."

Helpful hint

It's so nice outside, your secretary wants to beg off and go out and wash the cars a bit. Ruth and I both side swiped the

frozen snow bank at the driveway entrance and ended up with enormous dents in our car doors. The quotation for repairing hers was a hundred bucks. Last evening at sundown I went out with a "plumber's helper" rubber suction cup on a stick and after fastening it to each door, popped out both dents. Now I want to wash them off and see just how well my engineering feat came off. So until June, Cheerio!—*George W. Smith, Pigeon Cove, Mass. 01966*

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A memo from *Jim Donovan* dated the middle of January calls my attention to an article in the December 14 issue of the *Saturday Evening Post* that describes the work of the Bureau of Public Roads and its director of policy planning, *Ed Holmes*. Ed has been with the Federal Highway Administration about 40 years. The *Post* quotes Ed as stating, "We've been trying to build for the city as it now functions. But we've been pouring concrete into a mold that may be breaking up. Highways last for 50 years or more—they're the most permanent things we're building these days. But what kind of cities do we want? Do we know?"

A letter from *Ray Wofford* to Jim ends with an interesting paragraph. "We are thoroughly enjoying our retirement and our new home. I strongly recommend building and furnishing a new home in a new location as an apt and ideal means of transition from a busy and exciting business life." As many of us know, Ray retired with Frances from New York to 961 La Tierra Drive, Lake San Marcos, Calif.

A card from *Ted and Irene Hartshorne* includes the passage, "We have been here on Sanibel Island, Fla., since November 9. We go on to Mexico in February then back to Stony Creek in April. We have golf, fishing and lots of sun and quiet here. We both continue well and active."

A Du Pont news release reports that *Walter Matlage*, general manager of the Du Pont Company's Fabrics and Finishes Department, has elected to retire after a career spanning more than 40 years. Walter, 62, who lives in Weston, Pa., joined Du Pont in 1928 after receiving his engineering degree from M.I.T. His initial assignment was at the company's fabrics plant at Newburgh, he was transferred to the Remington Arms Company and worked at several ordnance facilities during the war years. He became director of production for Remington in 1948 and was named a vice president three years later.

From 1950 to 1952, Walter was vice president of Rem-Cru Titanium, a joint subsidiary of Remington and Crucible Steel Company of America. In 1952, he rejoined the Fabrics and Finishes Department as manager of the Fabrics Division, was promoted to assistant general manager of the department in 1953, and became general manager in 1959.

Deceased

A letter to your secretary from Dick Cheney, '27, sadly reports: "It is with much regret that I send you the attached clipping from the Pasadena, Calif., newspaper (I think of February 4, 1969, but am not sure of the date) telling of the passing of your class member, *Ford W. Sammis*. Ford did much outstanding work for us as market research consultant and his firm, Ford W. Sammis and Company, conducted some excellent research work for us. He was a real great guy, still as enthusiastic and bouncy at age 63 as he was in school. We are all going to miss him very much."

Ford died at his home in Pasadena following a six months illness. A native of New York City, Ford lived in Pasadena for 30 years. With his other work he was formerly consulting professor of marketing at Claremont Men's College and lecturer at U.C.L.A. and U.S.C. He was a past president of the Southern California Chapter, American Marketing Association. Surviving is his widow, Eileen, a sister and two sons and six grandchildren.

Many readers of the news probably saw the notice of the death of *Allen Richmond* who passed away January 24, 1969. His last job was Secretary of the Steering Committee M.I.T.'s Lincoln Laboratory in Lexington. Born in Auburn, Maine, in 1906, Allen spent the first two years after graduation from M.I.T. as assistant to the plant manager of Walter Baker & Co., in Dorchester. He later moved to Southbridge, Mass. where he was Executive Secretary of the Chamber of Commerce, Special Assistant to the President of the American Optical Company, and Administrator of the Harrington Memorial Hospital. In 1949, he moved to Hingham, where he was active in civic affairs. He was a member of the Republican Town Committee, the Hingham Yacht Club, and the Board of Trustees of the Hingham Public Library. He had been a resident of Acton since 1962.

Prior to joining the Lincoln Laboratory in 1955, he was Assistant to the Dean of the Harvard University School of Public Health and for five years Director of Public Relations for the Massachusetts Memorial Hospitals and the Boston University School of Medicine. Surviving are his wife, Helen, two sons, George G. and Staff Sergeant William W., U.S.A.F., and two grandsons, Christopher and William W., II.

We also grieve to report the passing of *William M. Grosvenor, Jr.*, of 444 East 82nd St., New York City on June 22, 1968, and *Howard A. Kely*, 630 West Bonita Ave., Claremont, Calif., on January 7, 1969. Howard was Course VI and retired.—*Hermon S. Swartz*, Construction Publishing Co., Inc., 27 Muzzey St., Lexington, Mass. 02173

29

It's May, which leaves only one month to prepare for the activities of the great 40th reunion at Wianno—time to start packing the tennis shoes, the golf clubs, swim suits, fishing gear, etc., etc. Understand there will be much to do and see and indications are that many of your classmates will be there to say hello to you. It's not too late to register.

From Bora Bora, Polynesie Française, we received a beautiful postcard from *Hunter Rouse* who says: "I can highly recommend this paradise as a perfect place to recuperate from a three-week assignment to India. See you in a few months!"

A newsclipping from Florida brings news of *Robert Sutherland* of Treasure Island, who is chief process engineer at Tampa Bay Engineering Company. He has been named to M.I.T.'s Educational Council.

John B. Ellsworth of Waltham, who is staff assistant to the vice president and commercial manager of Boston Edison Company, was busy in January as a committee member planning for the 30th New England Sales & Marketing Management Conference and Sales Rally of Sales & Marketing Executives of Greater Boston, which was held January 17 and 18 at the Boston Statler-Hilton Hotel.

We are sorry to learn that *Arthur Marsh* of Orr's Island, Maine, passed away January 7, followed by the death of *Hemenway R. Bullock* of Marlboro, Mass., on January 21. From the Alumni Records, we have word of the death of *Donald R. Schumann*, of San Diego, Calif., in February 1967. Our sincerest sympathy is extended to the families of our deceased classmates. Best regards to all.—*John P. Rich*, Secretary, P.O. Box 503, Nashua, N.H. 03060

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As noted last month both *Mark Culbreath* and *Stan Russell* have retired.

As of January 1, 1969, *Mark Culbreath* retired from Burns & McDonnell Engineering Co., in Kansas City with whom he had been associated since 1930. In recent years he had worked as Project Manager in charge of projects involving hydraulics, water works and sewerage facilities. He holds a P.E. license in some six states and the Province of Saskatchewan. Mark was president of the Kansas City M.I.T. Alumni Association for three years and is a past president of the K.C. section of A.S.C.E. He has also been active in the American Water Works Association, Missouri Society of Professional Engineering, National Society of Professional Engineering, Water Pollution Control Federation, and Missouri Water Pollution Association.

Stan Russell has retired from Johnson-Foster Co., Inc., of which he was presi-

dent and treasurer. As previously reported in the notes the Russells have two sons, both Harvard graduates. Stanley, Jr., went to Harvard Business School and Robert studied medicine at Columbia. Stan, Sr., says that, "This winter, have been visiting with both sons and their families. Was in Chicago, with our Doctor, then to San Francisco where we are staying with our eldest and his family. Will be leaving here on January 15 for Florida where we will stay for a while." Stan reports that *Stanley L'Esperance* has taken over his father's business and is doing well. Also he recently received a letter from *Ed Giroux* who is living in Maine and has done some building and remodeling of homes there.

Two of our classmates received awards at the December, 1968, meeting of A.S.M.E. *Rudolph Peterson*, who is a Consultant, Westinghouse Research Labs., Pittsburgh, was made an Honorary Member, and *Norwood Kenney* received a citation for "outstanding contributions in the wire and cable field, particularly in the pioneering work connected with the development and application of solid dielectrics for high voltage."—*Gordon K. Lister*, Secretary, 530 5th Ave., New York, N. Y. 10036

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At our 35th Reunion in June 1967 talk got started about having an interim reunion sometime before the 40th. Our Spanish contingent, represented by *Manley St. Denis*, jokingly (I thought) said let's have it in Spain. Since then this thing has become serious. *Ed Nealand* tracked down *Manley* (who has a Washington, D.C., address which is utterly useless) and received a letter from *Manley* in January 1969 as follows: "Your letter finally drifted to me in Honolulu where I am Professor of Ocean Engineering at the University of Hawaii. As to plans for the Barcelona reunion, *Juan Serrallach* is willing to make all the local arrangements. Savina and I are, of course, both interested in making the trip although it means going half way around the world. I am certain that *Juan* will enjoy hearing from you. I will write and keep him current on the project. I hope it does come off." *Ed Nealand* kept at this thing, and although I do not have his letter to *Juan* I have *Juan's* reply to *Ed* in February 1969.

"Dear *Ed*: Just received your letter and am sorry I couldn't congratulate *Pat* (*Ed's* daughter) for her marriage properly. She has a present waiting for her in Spain where they also could spend a marvelous honeymoon in a marvelous house on the Mediterranean Coast with sea, swimming pool, boating and skiing facilities. I think it better to have the reunion next year (1970) as it is too hasty now. You should give me an idea of how many people would come, as I have another place near *Alicante* with a marvelous beach and somehow I would take over all the expenses and invite everybody for a week in one of the two places. Both are

marvelous but entirely different. The *Berridorm* place (*Alicante*) is in the orange and lemon tree region and there is a first-class hotel with tennis and a big long beach next to my house where everybody could stay. The other is in the woods with rocks and little beaches in a complex with apartments, and I would have to organize somehow to get everybody in. The restaurant belongs to the community. Anyway, tell everybody I run with champagne instead of water, wherever we choose, at any time. We enjoy ourselves so very much that we don't have time to come to the States, but if business comes out as planned we might have to and then could talk things over. Regards to *Eleanor* and the rest of the family."

At this point *Ed Nealand* has volunteered to coordinate the trip at this end. Through this column and otherwise he will poll our classmates to see how many are interested in having the class organize such a trip. It might be possible to fly a charter plane to *Barcelona*. If you would write directly to *G. Edward Nealand*, Room E18-360, M.I.T., Cambridge, Mass. 02139 by June 1969, he can get some idea of the extent of the class interest and we can begin really serious organization by September. Please help *Ed* get a head count and make your suggestions as to dates that would be convenient.—*Elwood W. Schafer*, Secretary, Room 13-2145, M.I.T.; *James Harper*, Assistant Secretary, 2700 South Grant St., Arlington, Va.

33

Well, folks, when y'all read this current try (with three months dwell) it will be spring, no doubt; at least in some places. However, as I write, February 19, 7:00 a.m., it is 44° in *Fort Lauderdale*; no frost and no pumpkins. The grass is green just as long as it is kept watered, but May is something else again and is wonderful. Within 40 days, I have two trips to *Cambridge* coming up, and, the annual trip to *Mexico City* for the M.I.T. Club Fiesta. You will recall that I made a trip to *Denver* in January, and, on the way, stayed one night in *St. Louis* where we held an informal 1933 Class Reunion at the *Hilton Airport Inn*. Four classmates showed up (out of five ordinarily available) complete with their lovelies; *Ellis Littmann*, *Alfred Payne*, *Elmer Slick Henderson* (he claims no relation) and *John Sweeney*.

We had a really fine time, with pre dinner cocktails, then as nice a dinner as I ever had in *St. Louis*, and I have had some good ones. Just to show what the girls can do, here is a sample from "Vi" *Payne*. It seems that I made it possible for *Al* to see his classmates more, now that he knows who they are. Heck, I could have told him 3 or 4 years ago. The *Paynes* have been in *St. Louis* since 1965, *Monsanto* having transferred the old boy at that time. We carried the story when he became their *Utilities Specialist*. Now, to *Al*, when you make

these company trips, just drop me a line asking for classmates in the city where you are going, so you can phone them up for me and the rest of the class. Many of us do, Y'know. "We dropped down to *Acapulco* in 1968, and same year visited *Hawaii*. We want to go back, but, *Monsanto* has no plant there (yet)." Both *Payne* daughters are married (1964), and *Carole* is living in *Springfield, Mass.*, where husband *Bob* works for *Monsanto* as an accountant. *Carole* went to the *University of New Hampshire*. They have two children; a girl four years and boy now 2 months. The other *Payne* daughter, *Lois*, with husband *Phil*, is at the *University of Kansas* where *Phil* is working for his doctorate, and teaches English to Freshmen and Sophs. What with teaching, and the advanced degree preparation, it will take *Phil* another few years to finish up. *Lois* has her shoulder to the wheel, too, working in the computer department of the *University*. *Phil*, it seems, is a *State of Mainer*. The two of them spent Christmas there with *Phil's* family and did a lot of skiing. *Lois* and *Phil* met when they were both attending *Bates College* in *Lewiston* (Vi please note). Vi, I thank you very, very much, as you are the very first to try out my new scheme of talking the wives into writing me, rather than no one from each family; and such a nice friendly letter, too. Of course, Vi is also a *Yankee*, which should make us first cousins at least. Now, to all the men, why not get the girls interested in the *Review*, and M.I.T. Then see if they won't do some of the writing for you.

Lest, and perish forbid, I forget again, let me mention that *Johnny Wiley* was honored by newly inaugurated President *Nixon*, by appointment to the Task Force on Transportation. John gave no details, apparently there were 20 odd task forces assigned to as many public agencies. It might well be that these task forces are: still operating, and it is noteworthy that this task force business did not make the news.

Ellis Littmann dropped me a short note of thanks, earlier, and it, as always, was welcome. But, I did want to hear from *Roslyn* (Ros to you fellows). I expect to see a whole lot of *Ellis* in the next few years, what with his big 40th Fund raising job. The change of address, as a news source, looks better every time around. I got one of them from *William* (*Bill*) *Niessen*, so promptly asked him why he moved from *St. Paul* to *Marco Island, Fla.* *Bill* makes with the reply real fast like: "I am only semi-retired, and still staying five months per year in *St. Paul*," but his legal residence is now *Florida*. *Bill*, allow me to make a comment. If you stay six months and one day in *Florida*, you become a *Florida* resident automatically, and your tax bill comes through pronto. As I understand it, there is not any 4¢ sales tax on long time rents; six months or more. Anyway, that is how they find out how long you have been in the state. You were wise to become a resident, voluntarily, as you would have made it anyway. *Bill* is now doing some consulting (sic) work (as I suspected)

and gets in quite a lot of golf, north and south. Bill if I every get a day or so, I will sure call in at Marco Island. You are right smack in the middle of the Tarpon fishing country and I accept your invitation to go fishing sometime later on. Bill, if you have not tried the Tarpon, and you do fish, please try it. You might forget all about golf. I have caught just one of those jet propelled monsters and he did everything except jump right into the boat, and they have done that, too; one guide over your way says that one should have a piece of round $\frac{3}{4}$ inch cold rolled for him to bite on. Thanks for your prompt reply to my questions on addresses, and, don't stop now; something else may happen that could interest the classmates who don't write.

Back to St. Louis for a very welcome discussion of *Elmer C. Slick Henderson, Jr.* Again, I am indebted to one of our lovelies, Bess (Mrs. Slick) Henderson, who furnishes the material for as long an article as I care to write, and, I do wish that I had two pages for this remarkable family. Slicks' modesty, I fear, has not been too good for the Class History. It turns out that he is one of our more distinguished classmates. Some of the following is a bit old, but dang well little. A year ago January, Slick was guest of Honor at the 63rd Annual Kingdom of Callaway Supper. The Kingdom of Callaway is a Society formed by members of the Native Sons of Callaway County, Missouri, and they hold this annual supper first to celebrate their anniversary, but also to recognize a Native Son, as Guest of Honor, who has made good in his chosen field. The story of Callaway seems to be that the county was strictly Rebel during the Civil War. It appears that the State Militia was ordered to "invade" the county, and maintain a semblance of order. Colonel Jefferson Franklin Jones was commander of the Rebel Forces, and General John B. Henderson was in charge of the Union Militia. It is alleged that the defenders armed themselves with anything in the way of a gun available, whether capable of firing or not. Further, they made up a number of logs to look like cannon, and, at least one was actually found mounted. In any event, the defenders forced a Treaty of Peace, and with a promise to behave, the Union Forces allowed them to remain in charge. It is really and truly a bona fide story. It all actually happened, as I have heard it before. The perpetuation of the occasion is what counts, with Ol' Slick holding forth as a reformed Rebel. Very probably, Slick is descended from Gen. John B., above, as the Hendersons showed up in Missouri in the second decade of the 19th Century.

To get on with the subject, Elmer C. (Slick) Henderson is Vice President and Assistant Treasurer of Sverdup and Parcel and Associates, of St. Louis, and he is also on their Board of Directors. The firm has a surprising number of employees, 900 or more. So, according to McGraw-Hill, they are the second largest firm in the U.S.A. in terms of volume of engineering and architectural design. I

wonder who is first. Anyone know for sure? Slick was a graduate of Westminster College of Fulton, Mo., before he entered M.I.T. where he took an S.B. in architectural engineering (IV-A to Lou Flanders et al). Then, still not happy, he went to Washington University of St. Louis and got himself a masters degree in civil engineering. After battling around in local and state work for three years, in 1938 he became a partner in Henderson, Elsner, and Merrick, Engineers and Architects, in Fulton. He was with Stone and Webster briefly in 1942, when he went into the U.S. Army Corps of Engineers, emerging three plus years later as Major Slick. Again, briefly, he was with Giffells and Vallett, of Detroit, also Engineers, in 1946, and later that year went with Sverdup and Parcel and Associates, and he is still with them, not to say of them. He is also a registered Engineer in seven states.

Poor Slick

Now, friends, this is where it gets real good and enjoyable as the material is furnished via personal note to her cousin (Me) by Bess Henderson. She is just further proof that these Henderson wives are really outstanding; I know as I had one for a mother and another for a wife o'mine. Golly, the more I read this letter of Bess', the more I appreciate the girls, and the opportunity I, and all secretaries, miss by not writing to them instead of the men. "Slick found himself in a predominately female household, and had to resign himself that females do have wills of their own." Even if Bess did not specify, she meant that the girls chose, among other things, their own colleges. I recall mentioning to my own daughter, Phyllis, that Bryn Mawr was an outstanding Women's college. "Yah, yah," sez she, "I am going to Wellesley, and don't you forget it." So, where did she go? You guess. Daughter Judy chose Vanderbilt and made Phi Beta Kappa taking her A.B. *Magna Cum Laude* (magna yet). Lois went to Atlanta to teach, and, came home with a southern young man, married the guy in June 1965, went to Grand Rapids, Mich., where he went to work for Lear-Seigler, and also came up with the first Henderson grandchild—another female. Poor Slick, or is he? Daughter Patricia went to De Pauw, a mathematics major, married a math major from the same school, took an A.B. and they then moved to Missouri University, where the young man worked for his masters. He is now in the Air Force and Patricia is serving as systems engineer for I.B.M., programming a new installation for the Sante Fe yards in Kansas City. Son, Alan, became the third (generation) Henderson to graduate from Westminster, taking his A.B. in 1968, and is now at Wharton School of Business and Finance. "Daughter Sara is quite concerned with engineering a car as she makes the approach to sweet sixteen." Bess, almost forgot to mention that she, too, chose a college, and went to Drury, Springfield, Mo. And, she seems to have had an idea that proper therapy might take the place of psychiatry, so, long ago, she studied the violin, and still

plays, through she avers that her mind and eyes travel faster than her fingers, and arms. Well, whose don't? Now, it seems that I mused up the procedure way back in not mentioning that our Slick is a member of the Board of Trustees of Westminster, and was formerly President of their Alumni Council. And, last but not least, daughter Judy was born in our own Boston, which "makes her a Yankee, no?" Bess, I do think, truly, that you are just the nicest gal. You give me courage to carry on with my plan to write a few wives here and there, in the hopes that, 1) I can get more of a response from the family, and 2) make a new set of friends for M.I.T. And I sure do thank you from the bottom of my heart. In St. Louis, in January, I saw four classmates, and four lovely wives, so, Bess, I had 8 times as good a time as any one there. And Elmer, Slick, this is going to have to do you for a long time, or whenever I need more news, whichever comes first.

The trouble with bucket seats seems to be that all buckets are not the same size. Well, folks, wonders will never cease, so help me. Here's one from our own *Athelstan Spilhaus*. Previously, we made mention of the fact that Athel had resigned as President of the Franklin Institute, or something, in Philadelphia, after not too long a tenure in that position. Also, he came through with a change of address, which is always, to me, an opening for a post card of inquiry. In this case I used a Note-O-Gram with the return feature, and ol' Athel took advantage of the return feature, and, he doesn't write too often, so there. It goes (reply): "Gail and I are leaving for Cape-Town, South Africa, next week, to see my 91-year-old mother, so our trip will be that part pleasure, and we will have a little business, too" (deductible, of course, Ath?). Now, here is the punch line: "After our return in April, we will live in Palm Beach, and, as the Hippies say, 'do my own thing.'" So, Ath, old boy, please translate. I didn't know that Deans of Engineering were hep. He goes on to say that he intends to do a lot of writing, consultation, lecturing, serving on boards, etc., not to mention the presidency of the American Association for the Advancement of Science; "with high air mobility, I have decided to live in the sun."

Y' know folks, a lot of good and helpful fellows write to yours T and here is another, *Walter F. Swanton*, of the Pfaudler Co., of Rochester N. Y. and also Avon (way south). Though brief, Walt covers the ground when he writes in the *Chemical Engineering Progress*, of The First International Seminar on Metal Finishing which took place in Mexico City in mid-January. This was a combined meeting of the American Electroplaters' Society and the Association Mexicana de Tecnicos on Galvanoplastic, A.C. Though many Americans attended this seminar, it is only natural that a great many of the best of the Mexican professionals in this field also attended. Walt adds, in his reporting letter to *Progress*, "since I am a member of the A.I.Ch.E., I thought that

this might be of interest to your readers." Walt signs himself as Manager of Pfadler's Waste Recovery Systems. If you fellows had been paying attention you would have known this last, as it was reported here months and months ago. Walt, we appreciate hearing from you and we do hope that you will do this every time your professional group decides to use Mexico City for cementing hemispheric relations, especially in Mexico City in January.

Here is a quickie, and from Mal Mayer, who says that were it raining soup, he would be armed with a four tined fork. What he means is that he went to South Africa (beer research), hoping to see Wolfgang Kloenne, and Lambert Snow, among others. He saw not either, for sure. That's about the third try for Mal on those two characters. Then, with more confidence, he went to London and tried to phone Robert (Bob) Dodd, and again threw a seven, second pass. Well, Mal, I ain't tried South Africa, but this Dodd is a wary cuss. I couldn't raise him at all, either, though I did get the (British) hall porter. Dodd must know by now that we are after him. Mal writes from Carmel, Calif., though he lives in Washington, Maine. Mrs. Mayer's boy is nothing if not real bright. He won't stay in Maine winters. However, he is going East (Beer), then to the Caribbean, back to London, and away he goes to Schweiz, for a mid-May meeting of brewers. Mal's mother-in-law, a lovely dish, and his lil ol' Ellie were, then, with him in Carmel. Thanks, Mal, and try Dodd again, come April. Always glad to get these little beer excursions into the record.

No longer honorable?

Well, sir, after long trying, I have, finally, a word from Bob Winters. A letter from me, earlier, went quite a while without reply and then came a fine missive from Robert attached to his latest biographical sketch. I have not yet absorbed the the new biography, but, it seems to me that it cannot have changed much since the last one, a year or so ago. So, I will not depend to much on it. When Bob left the political scene in Ottawa, Alumni Records Office told me to drop the "HON.") How does one like that one? A man can't be Honorable unless he is in politics, and, from what I hear and see in the papers, they got it all backwards. Records, I will continue to consider Bob as being honorable until he proves otherwise, at least where it shows. It has been reported that Bob is now President of the Brazilian Light and Power Co., of Toronto, and, in Bob's letter, he announced that he and Eleanor had just returned from a South American trip, presumably business. Who visits the east coast of South America at the Topic of Capricorn unless he is a tourist, or, on business. Egad, you fallas ever tried that climate?: Rio, Santos, Brazilia, any time of year? One does not stop perspiring until the second generation.

Bob says that he visits the Institute quite often as he is a Life Member of the Corporation (he did not say this), and is

on the Visiting Committee on Political Science (he did say this). He will be in Cambridge March 17 for that committee. Anyway, he is resourceful since he easily misses me—I will be there March 3, and March 28. Bob is always cordial in sending his best and those of Eleanor to me and Leona. Say, I must apologize to Ellis Littmann, for forgetting what he sent me via a press clip about Bob. The biography, which I now have read, brings me a sort of red face! Ellis' clip had it that Bob had been elected a member of the Board of Caterpillar Tractor Co., Peoria, Ill. I now can list all this remarkable fellow's Board work via his biography. Bob is a Board member of the following: Alcan Aluminum, Ltd.; British American Assurance Company; Canadiar Ltd.; Caterpillar Tractor Co.; Crown Life Insurance Co.; Crush International Ltd.; Ford Motor Company of Canada, Ltd.; The Imperial Guarantee and Accident Insurance Company of Canada; International Business Machines Company, Ltd.; and the Western Assurance Company. That is an impressive list, for sure, and men, here is a Champion. Aside from the fact that he is well fitted for this type of thing, he loves it, too. I often wonder what these guys do with the other hand! This man, by the way, is, in Canada, a Liberal. I have a Canadian next door neighbor and I must ask him if we can't exchange views on what we each think a liberal is. Bob, it always is wonderful to hear from you.

Now comes a fine two-page, typed letter from Jack Frost Andrews. Brenda, you think that my typing hits bottom? I will send you Jack's letter, stressing the fact that his typing, like all typing, can be read, while some handwriting cannot. Jack and Jermain did not make the 35th for these reason: they got caught in the middle on house hunting, in the situation where one gives up one house but can't get into the other for a few more months. This is a quick summary. Jack said more, but I cannot expose Brenda to such language. They did get an interim job, "house sitting" for friends who had an empty house that needed company. Further, young Johnny, son, was about to graduate, (they hoped) from Princeton High School, and, it appeared that he needed some continuous supervision on his home work, preparing for the inevitable exams. Golly, what would Steve Crick and I ever have done without Hoppy (Neil Hopkins) when we had exams? Well, to make a long story monotonous, Johnny made out, summa, I mean some, at least, and got a P.T.A. scholarship. Say, that young guy really got a lot of supervision, or something. Jack is rounding out his third year as a member of the Board of the Princeton Skating Club, and the same number as Trustee of the church; this year as Board Chairman. The only change in the family status is that Gwen is in Spain studying the language, and the rest of the family are all as was reported in the January issue (look back, you might be followed). Jack lives right between the two local M.I.T. clubs, the Delaware and the Northern New Jersey, so gets to

neither (which makes him one of a vast majority). Jack, you could, were you so inclined, give me quite a lot of help by attending these shindigs and making reports on classmates loose those nights. And, Jack, the driveway at Exeter, 22 feet wide at the entrance, is always open but I am there only May to November. Sure, drop in. But if you need a quick one watch the calender.

Men, I cannot get by one of Jack's comments, as it concerned Ed Goodridge. Ed and Jack were real close, though more so right after they got out of school and were in and around New York City. Jack is very modest in some ways: we all know that Ed Goodridge was Chairman of the committee which brought out the 25 year class record, titled, *25 Years Later*. The committee is listed in the foreword of the 25-year book, as Goodridge, Chairman, Andrews, Fleming, Garbarino, Maynard, Ropes, Swain. So you see, Jack knew Ed long after they go out. Fellows and Gals, here is a plea: the Alumni Association, through Ken Brock and his office, assists our 40th Reunion Chairman in running the 40th Gift Campaign. I have had two letters from 1) Ellis Littmann, Chairman of the 40th Gift Committee, and 2) one of Ken Brock's boys, both asking for help in finding several copies of the 25-year class record book by Goodridge et al. You would be doing your committee a great favor were you able to locate a copy among your classmate friends, those whose interest seems to have flagged. I can send you 375 names of such. It occurs to me that some of you might know some of the widows of classmates who might be able to dig up a copy or two here or there. I, personally, would like to find 10 to 12 copies, as I have a call occasionally from an individual. If I were to receive 12 copies, I would give 3 to 4 to the present committee, and then sell the remainder to classmates who ask for them stipulating that the recipient of each copy send the Alumni Association \$20.00, deductible. But, the main purpose right now is to get 2 to 4 copies into the hands of Ellis Littmann's committee. He needs them rather badly, or will very shortly.

Now, with Jack's connection with the aforesaid book advertised properly, may I thank Jack most sincerely and emphatically for being so nice to me and his classmates. Incidentally, Jack made a comment which needs mention, and reply. He said that he is surprised that the Editors of the *Review* allow as much mention of family material as they do. My reply would go something like this, were I asked: "What are the purposes and reasons for publishing what is actually the M.I.T. Alumni Association house organ?" I would proceed to answer this question Yankee-wise by asking another. "What does the Alumni Association do for M.I.T. and what do its members do individually?" You get the right answer to these two questions and, Jack, you will have no need to ask further. Just as a comment, except for a few bachelors our lives revolve around our families. If our Alumni body is to revolve about its sun,

the Institute, then what is more important than the family of each of us? Class-mates, I have heard about and seen from literally dozens of alumni magazines from other colleges. In my humble experience, you have a chance to read the very best I have seen—and I am a tough judge. The text material is outstanding and the personal section is just as outstanding. I expect that that is enough Institutional Advertising, so we may now proceed to the late arrivals.

At long last, we hear from *John David Sweeney*, of the Savin Hill Sweeneys. While this hearing from John is not exactly spontaneous on his part, I heard from John and I love it. I do not hear from many from whom I should hear. John's professional story comes to us via letter, and backwards, because it is easier to remember it all that way (there is some merit in this). John has, for four years, been Chairman of the Joint Board for Registration of Architects and Engineers, State of Missouri. The work of this committee is toward the complete revision of the Registration Law, which, apparently, is at best, inadequate. Their job is but half done, as the actual passage of the law's revision is yet to come. John is quite proud, and justly so, of this next, and I believe that it deserves a quote. ". . . my activities were largely associated with the St. Louis Chapter, American Institute of Architects, and I have served in just about every available capacity, including a 30-month term as President of the Chapter. For this I received the most coveted Honor of a Fellowship in the A.I.A. so please note the heading, F.A.I.A., above." John, you get and deserve our most sincere congratulations on this most "coveted" honor. He says, "I like to think that my activities in these professional groups has caused changes for the betterment of the profession. [John has also been President of the Missouri Association of Architects.] However, I still find time to practice in architecture, in spite of the seemingly overwhelming encroachment upon my time as an architect." John's good wife, Kathryn, reminds him that he appears to have a capacity for acquiring "glory jobs," which are, directly, so unrenumerative. The inclusion of the word, "directly" is mine, but it is also John's as he well knows. John ends with a short one, "This at least breaks the ice after so many years of silence." How true, and also how nice to get the dang ice broken. And, Messers Crick, Moeller, A. Hayden, Amadon, and others, when J.D.S. breaks down, it is high time I heard from about 50 more of you characters. John, the thanks of your class goes out to you.

Calvin Mohr now comes through again, though this time it is a bit shorter. Maybe Cal has found out that my shortage of news comes as I write during the early winter; no shortage for April, May, June or July notes. Cal mentions *Bob Dillon's* return from New Orleans, reported here after the address change. I have no real news of Bob, so Cal enters with this; "Robert (Bob) Dillon is now Production

Manager for Union Carbide, for the areas of California, the entire Gulf Coast, and Puerto Rico." Bob says that he cannot attend the A.I.Ch.E. meeting in New Orleans, March 16, as he is already tied up. Cal expects to see or talk with a whole covey of classmates during this meeting. Thanks, Cal, and best both to you and Jean. Oh, man, I almost left out the part about *Win Partridge* moving to Bay Saint Louis, Miss. He did not tell Cal what the move was for, retirement or a business move. You look into it, Cal, and I will wait.

You'll recall that I had in a recent issue of the *Review*, a list of fellows from whom we need a snapshot for the 35th record. One man comes through with a promise for five snaps; our good Home Office man from Charlotte, N.C., your own Vice President *Beaumont H. Whitton*. Beau is a man of few words, about 35 to be exact, and in these 35, he and Daphne are taking a trip to the Mediterranean in the late spring. He also reports that they had snow in the "sunny south," a record, yet, of 12.3 inches. Beau, who measured the 12.3 inches? That's it from Beau, and, again, I need more Beaux (plural?).

Speaking of snow, last Monday, March 3, I went to New York City (Kennedy), bus to LaGuardia, making for the shuttle to Boston, and the monthly meeting of the Alumni Council. Well, sir, though not too surprised, I was disappointed to find that no planes were leaving any place for Boston as that town had no available airport; Logan was closed but tight. So, I stayed in New York City and phoned many classmates; I talked with *Guido Garbarino*, *Richard (Dick) Gorman*, and had several short ones with *Henry Kiley*. While I made several unproductive calls, I came up with much info.

Dick Gorman is with Union Carbide, and has been in their New York City office since 1955; no mention of what the job is, now. Good wife, Kathleen, and Dick have one son, Bart, Yale 1966, and University of Michigan Law, 1969. I gathered that Bart is also married. With no details given, the Gormans do some personal travelling, and he probably does some on business, but his hobbies are sports, such as golf and, formerly, at least while in Cincinnati, he was active in Boy Scout work. Dick, if this is garbled at least it has some factual basis. We had a delightful talk. I did appreciate your time, Dick, and if you think of more, just drop it into the mail.

I located *Walter Galazzi*, Chief Engineer, York Division of Borg-Warner. I spoke with Walt's secretary, who promised that he would call right back. So, when he did call back, I was busy talking with someone else, and then when I called Walt back he had left for lunch; not very bright, this Walt, as I was going to buy the lunch. I will get Walt later. The phone discloses that *Kenneth (Ken) Moslander*, formerly with Linde Division of Union Carbide, has retired, but to what we don't know, as yet. Further, *Roland*

Glenn, also of Union Carbide, had retired, again to what is to be determined. Another call, this to *Johnny Howell*, discloses that he, too, is missing. John's Company, Middlesex Engineering, has moved from Lower Manhattan to Jersey and the phone company gave me the new phone number. I called that number only to find that John has left their employ and has just done gone away. Heck, we had seen Johnny since then at the 35th. Though he did not make much talk about it, it appears that they also broke up the marriage about the same time. Looks like I must write to Howell, Moslander and Glenn. I expect that these fellas who have retired have taken up consulting work, which seems to be the dodge used most these days.

One extreme pleasure came when *Henry Kiley* came way north to the Plaza from the jungles way downtown, just to have a couple of drinks with his old grandpa and to gas a bit on old times. Henry attended the 25th, so it is only ten years since he reported in favorably. I picked up a bit of choice gossip about my boy, elsewhere, and it turns out that ol' Henry did find himself a wife at the Institute. The lovely Mary K. was a Smith grad, who came to the Institute for a math masters and old Henry, wide awake as usual, got busy. Word gets around that he stayed at the Institute a few years, perhaps for this reason, or, he couldn't get a job elsewhere, or, he wanted an advanced degree himself. Facts come out that all three of these are true. So, Mary K. and Henry have raised a family; daughter, also Mary K. is married and living in New York City, no children as yet, and she operates her own company which is called Meadowbrook Systems. She was formerly with the Reader's Digest organization, and, she is also a Smith gal. Son, Henry Jr., is a graduate of Notre Dame. After completing his fifth year in the Air Force, he accepted a position with Western Airlines, as, to start, a Second Officer in the cockpit. I told Henry that we both were born 30 years too soon. Second son, Kevin, is a graduate of Tufts, and is now an Ensign in the Navy, presently at home in San Diego; no details here. Well, now that we have covered the Kiley family in some detail, we find Henry working (slaving) he says, for the Overseas Chemical Division of W. R. Grace Co. With such a job as this, Henry travels, sezze, almost 30 per cent of his working time, mostly by air, of course, even though the Grace outfit was originally a steamship line. Here is an oddity, the man says that he has no hobbies, as other men do. But, he does all the house maintenance at the Kiley home in Chatham, N.J., and is also quite skilled at house gardening and flower raising. I suggest that he does have hobbies, or hobby. Some of you might well understand what a pleasure it was for me to meet with Henry for even an hour.

Old friends are still among the best, for sure, and further, what a pleasure it is to be able to report on our short conference, where we mentioned so many of

the boys. He asked about *Jim Turner*, who was a Malden or Melrose boy himself; *Mal Masters*, Winchester (still is); *Art Hayden*, Reading; gee, I shoulda wrote them down. Anyway, you three can drop me a line and scold me for not writing you up sooner. Say, *Mal Masters*, I can't get a word out of *Fred Feustel*. Will you not arouse him, if he is not still provoked at me? Back to *Henry K.*; thanks a million, *Henry*, for spending the hour with me and for going way, way off the beaten path to do so. We all appreciate your extra bit of effort. I will go to lower Manhattan the next time, and have some lunch on you, if I am invited. That closes out the available gossip, so that we have only to close gracefully. First, I need many more snapshots of those previously listed as not having sent me one. Second, and from now on for four plus years, no one will be allowed to forget the 40th Reunion Gift to the Institute, *Ellis Littmann*, Chairman. The big opening gun meeting of the 40th Committee, plus all Class Officers, will be held at 12:00 noon, April 28, 1969, and will be over when you read this tome. I expect to see *Ellis* in St. Louis, April 12, for the big midwestern St. Louis M.I.T. Seminar and Conference. I wouldn't miss it for the world, and, if I have time, I will attend all future such conferences. That's it, folks, and you will just have to get along with this until the June issue comes to you.—*Warren J. Henderson*, Secretary, Fort Rock Farm, Drawer H, Exeter, N.H. 03833

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George Patch keeps in touch with *Ray Jewett*, since they married sisters. The meetings at Thanksgiving and Christmas have become routine. Butch says they will both be at the reunion, which we'll hope means all four of them. Butch, if we can still call him that after 35 years in the Linde Division of Union Carbide, is Manager of International Planning. Does this mean he travels? Indeed it does, primarily to Europe, South America and the Far East. That covers most of the world! Perhaps that is why he has never been to the local M.I.T. meetings at Westport, Connecticut's Clam Box, though it is only a half a mile from his home. Ray, by the way, took his wife to Mexico City in February, apparently so as not to lose his Latin American know-how gained in Panama in 1934.

Bob Roulston lives in lovely Ridgefield, Conn., and works as project manager at the nearby Perkin-Elmer Corp. More than ever, he looks like a prosperous banker, but a good hearted one.

Walter Kut, from his base as professor of Mechanical Engineering at Cooper Union in New York City, gets around to many professional meetings, but never seems to run into any from our "super class of '34." Oh, yes, he did run into *Stan Doroff*, on the M.I.T. campus!

Al Rogowski always reads these class notes and finally decided he'd better do some contributing too. (Of course, he was

threatened by this secretary, which helped him reach that conclusion.) After working with Worthington for 28 years, the connection was severed. He helped *Johnny Westfall* in his fiber glass business in West Barrington, R.I., for a while, just about commuting there from his home in West Orange, N.J. Then he was consultant to a small firm making closures for the apparel industry. He converted a chemical plant to a manufacturing plant and traveled to Europe, returning with a batch of automatic machines for shaping and drilling plastic buttons. This seems to have been a success, for he set up another plant in St. Thomas, V.I. This, he says was "real fun" to get going, for he repeated his commuting to work, swimming at one end and snow shovelling at the other, the ordeal, depending on how you look at it, lasting two years. Al points out that part of the value of such frequent travels lay in the fact that St. Thomas is a free port. Al's wife, Anita, works at Kessler Institute of Rehabilitation where she is in charge of social welfare and admissions. Al has built himself a greenhouse for his gardening hobby and did a complex job for the Unitarian Church, "using prestressed concrete materials and techniques, we pulled together seven wooden truncated, scissor-trusses with side wall," doing a fun but hard work restoration job. Al and Anita have travelled a lot out west at various times. To mention a few points: Jackson Lake, Lake Louis, Lake O'Hara and Vancouver.

Larry Stein is "schizophrenically" divided between the power field and electronics in his work with Sigma as Applications Engineering Manager. The work covers relays, stepping motors and utilities products and some development work left over from former duties. He leads a busy life being on the school committee in Hingham, which is enough in itself. One daughter, after graduation *cum laude* from University of New Hampshire is now a registered technologist in Meridan. Robert follows his father's bent for electrical engineering and does so at Worcester Polytechnic. Another daughter has talent for the french horn and the paint brush. And the last daughter is the one who shines!

Wilbur Jones, after losing his wife some time ago, recently lost another lady friend of whom he was seeing a good deal. He writes that he is still a bachelor—and looking, showing there is still hope. He is active in the Christian Science Church, does some law work, ice and roller skating and intends to take up tennis again.

Ed Taylor is retired and devotes his time to sailing in Maine in the summer and seeing the world the rest of the year. He, along with everyone mentioned above, will be at the reunion on June 13. Those last minute deciders, you can phone *Paul Wing* at home: (617) 749-1996 or at work: (617) 762-4600 and can send you registration check for \$15 or \$25 (double) to his home at 12 Weston Road, Hingham, Mass. 02043. There will be a big group,

far better than even last reunion when so many were there.—*James Eder*, Secretary, 1 Lockwood Rd., Riverside, Conn. 06878; *W. Olmstead Wright*, 1003 Howard St., Wheaton, Ill. 60187; *Norman Krim*, 15 Fox Lane, Newton Centre, Mass. 02159; *George Bull*, 4961 Allan Road, Washington, D.C. 20016

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Our 35th reunion will be held at Chatham Bars Inn, Chatham, Cape Cod. This is a switch from our original plan. Arrangements were made to go to Oyster Harbors but the Oyster Harbors Club is being rebuilt and is unavailable. The facilities at Chatham Bars are excellent and the management has been very cooperative. We had our 20th and 30th reunions there so many of you are familiar with it. The dates are Friday, Saturday, and Sunday, June 12, 13, and 14, 1970. Make your plans to attend now. Rates and details are unsettled at this point in time. They will be set this summer and you will receive a formal mailing and announcement this fall. We will make at least two mailings, the first to everyone and the follow-up to those who show interest.

Start promoting this with the folks you would like to see. It is possible to put couples or groups together so make plans with your friends to attend. Sunday evening at M.I.T. free lodging and entertainment are offered and Monday is Alumni Day. Plan to return to Boston and attend Alumni Day. You will find it enjoyable and very inexpensive. The school provides room both Sunday and Monday nights and breakfast Monday and Tuesday free of charge. You will hear more from us early this fall.—Co-Secretaries: *Phoenix N. Dangel*, 329 Park Street, West Roxbury, Mass. 02132; *Irving S. Banquer*, 20 Gordon Road, Waban, Mass. 02168

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The list of newly elected Fellows of the Institute of Electrical and Electronic Engineers includes many M.I.T. graduates of whom two are classmates: *Franklin S. Cooper*, for studies in the correlation of speech units from the physical, physiological, psychological, and phonetic aspects, and *Edward S. Halfmann*, for significant contributions to the science of control and instrumentation, and for the application of analog and digital computers to the more efficient operation of electric power systems. Our congratulations to both of these new Fellows. *Walt MacAdam* as Senior Past President of the I.E.E.E. is a member of the Board for 1969.

The annual Lippitt newsletter recounts some interesting tripping which *Henry* and *Ruth* have done, Mexico in May, Ireland in July for the International Bar Association meeting, 10 days on Hardanger Fjord in Norway. In addition to serving as Executive Secretary of the California Gas Producers Association, *Hank* is a Director of the Los Angeles

Area Chamber of Commerce and Chairman of its Water and Power Committee.

W. Boynton Beckwith reported to the Air Transport Association Committee on Meteorology, of which he is Chairman, that "Significant progress is being made in airport fog control." The programs have been launched through the joint efforts of the airlines and airport authorities.

In case we hadn't reported it before, *Dave MacAdam*, one of our graduate members is Editor of the *Journal of the Optical Society of America*.

Along with his check *Albert Del Favero* sends word that he is still Chief Engineer with *Oman Construction Company* in Nashville. His address is 410 Sunnyside Ave., Nashville 37205. . . . *Ruth M. (Humphrey) Perkins* is teaching in the College of Education at Temple University. She finds teaching math to under graduate education majors, many of whom are not mathematically oriented, a challenge to say the least. . . . *Frederick MacDonald* has taken an early retirement after 32 years as architect for the First National Bank of Boston. He has established an office in his home in Scituate, from which he carries on a small private practice. His address is 121 Gilson Road, Scituate, Mass. 02066. . . . Your secretary this month becomes President of the Unitarian Universalist Women's Federation. Between that office and her presidency of the Massachusetts Girl Scouts, Inc., as major responsibilities plus several lesser ones, she sometimes doesn't know where the time is coming from for all she wants to do. Nevertheless she is always delighted to hear from any one of you.—*Alice H. Kimball*, Secretary, 20 Everett Ave., Winchester, Mass. 01890

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Eric Moorehead is a consulting structural engineer in San Francisco, he has four children of which three are married. He also has two grandchildren. . . . *Bob Ferguson* is vice president, engineering services, of a subsidiary of U.S. Steel, U.S.S. Engineers and Consultants, Inc. Its purpose is to sell U.S. Steel patents and know-how and to perform engineering and consulting services world wide to the steel and related industries. . . . *Gil Mott* was recently appointed vice president, engineering and research, of the Aluminum Division of Olin Mathieson.

John Fellouris recently finished work on a \$1.3 million project for the North Attleboro Housing Authority and is now building the \$1.5 million Williams Middle School in Bridgewater. John, a native of New Bedford, organized his construction company in 1957. He was discharged in 1946 following service as a captain with the U.S. Army Corp of Engineers and became chief engineer of foreign operations for the Greek War Relief Association, Inc., in Athens. From 1946 to 1955 he did extensive construction work in Greece, building hospitals, health centers, sanitoriums and water supply sys-

tems. His firm has built schools in Mattapoisett, Fairhaven, Hyannis and Centerville, the town hall in Falmouth and the control tower on Nantucket.

Dick Fowler, M.D., is an Associate Professor of Medicine at the George Washington University Medical Center. He is also president of Medical Engineering Corp., vice president of the School for Contemporary Education and co-director of Medical Engineering, Science and Technology at George Washington University. . . . *Phil Peters* writes, "Ruth and I had a wonderful European vacation trip in October 1968—saw our middle son, Greg, in Germany and Paris. He's a Lieutenant, U.S.A. I had two business trips to Europe in 1968 and all over South America in 1967 regarding John Hancock affiliation with the top National Insurance Company of each country to serve group insurance needs of American international corporations. I'm in middle year of a three year term Director, Greater Boston Chamber of Commerce and U.S. Advisory Board member of Association Internationale Des Etudiants En Sciences Economiques et Commerciales, also Director of new Belgian corporation, John Hancock International Services S.A."—*Robert H. Thorson*, Secretary, 506 Riverside Ave., Medford, Mass. 02155; Professor *Curtiss Powell*, Assistant Secretary, Room 5-325, M.I.T., Cambridge, Mass. 02142; *Jerome Salny*, Assistant Secretary, Egbert Hill, Morristown, N.J. 07960

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While your Class Secretary's on Mexican Fiesta,
His secretary hoped to have siesta;
But as you have noted from last month's report,
Here I am, without warning, left holding the fort.
Each day, when the mail came, my face grew more solemn.
No news was arriving to fill up the column.
Just when I'd envisioned a place on the headline,
An envelope came, just under the deadline.
So here is the news, for better or worse.
At least you've been spared any more of this verse.

Frederic A. Jenks writes: "I am still at Raytheon Co., Bedford, Mass., after 22 years, working on advanced aerionics systems for the military. Two daughters are married, and another in high school. Two grandchildren. We all ski and horseback ride a lot." (Actually the former was the only direct news received. The rest are quotations from various publications which were forwarded. I guess the sender knew how desperate I was to fill in the spaces.)

From *Physics Today*, *John A. Harvey* of Oak Ridge was named Secretary-Treasurer of the Nuclear Physics Division of the American Physical Society.

From *The Trend in Engineering*, *A. T. Rossano*, Professor of Civil Engineering, has been elected a vice-president of the Air Pollution Control Association. He has been appointed to the 12-man National Air Pollution Control Techniques Advisory Committee of the National Air Pollution Control Administration. He has also been elected a Director of the American Academy of Environmental Engineers for 1968-69. . . . *Albert O. Wilson, Jr.*, has been made a Director to the Board of Associated Industries of Massachusetts, so says *The Magazine of Cambridge*.

I do not like to conclude on a sad note, but a clipping was received from the New London newspaper stating that *Seymour Gross* had died very suddenly on February 10. He collapsed on the street and was announced dead on arrival at the hospital. He had been a branch head at the Navy Underwater Sound Laboratory in New London. He is survived by two sisters.

Please, Please send in news, be it sad or merry,
So I won't lose my job with your Class Secretary.
I'm forced to swallow the bitter pill;
His trip caused this void which I couldn't fill!

—*Pat Jordan*, Secretary to: *A. L. Bru-neau, Jr.*, Hurdman and Cranstoun, 550 Broad St., Newark, N.J. 07102

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Thirtieth reunion news first. As of mid-March, Chairman *Ernest Kaswell* reported from the first mailing over twenty "definites" and over forty "maybes." Couples, that is. Place: Wychmere Harbor Club, the enlarged Snow Inn which many of us remember from earlier reunions. Time: Friday, June 13, through Sunday, followed by Alumni Day in Cambridge on the 16th. For further details, contact Ernie at 67 Paulson Road, Waban, Mass. 02168 (617 B14-3240) or *Seymour J. Sheinkopf*, 1350 Blue Hill Ave., Mattapan, Mass. 02126. Based upon projections and upon the experience of other thirtieth reunion classes, our Committee expects at least 100 classmates and wives to attend. So, get on the band wagon and come prepared for a rousing good time!

Harold R. Seykota, Course XV, that world traveler, has landed his biggest challenge yet as vice president and general manager of CF Chemicals, Inc., a new subsidiary of Central Farmers Fertilizer Company, of Chicago. Hal will operate the Bartow (Florida) Phosphate Works, recently acquired by CF from International Minerals & Chemical Co. Now that Hal and Hilda are back from Holland, Korea, and South America, you can bet that they will be on deck for our Thirtieth. Incidentally, son Edward is completing his fifth year at M.I.T.

Harold R. Chestnut, VI-A, of the General Electric Research and Development Center, Schenectady, has been named



H. R. Seykota, '39 H. Singleton, '40

Treasurer of the Institute of Electrical and Electronics Engineers, for 1969.

Robert V. Hess, Course II, served as general chairman of the A.I.A.A. 7th Electric Propulsion Conference and participated in a paper "Onset of Rotating Disturbance in the Interelectrode Region and Exhaust Jet of an MPD Arc." Bob is Head, Plasma Physics Section, N.A.S.A. Langley Research Center, Virginia.

Gordon E. Holbrook, Course II, Director of Engineering for the Indianapolis plants of G.M.C., is currently president of the Indianapolis Scientific Engineering Foundation. A recent activity of that group was to sponsor a Future Scientists and Engineers Day for 300 central Indiana high school pupils.

Roger W. Swartz, Course VI, wrote that he is planning to attend the Thirtieth. He recently retired from the F.B.I. Laboratory where he was Chief of Radio Engineering. He is taking up consulting work, operating out of his home at 5916 Wilmet Road, Bethesda, Md., 20034. Thank you for the letter, Rog, and we'll see you at Harwichport!

Vija Sethaput, Course XII, wrote that he is now Director-General, Department of Mineral Resources, Rama VI Road, Bangkok, Thailand. He would like to see more M.I.T. Alumni investing in mining in Thailand. Currently he is vice president of the M.I.T. Alumni Club of Thailand. Looking for business opportunities, anyone? Write Vija!

Charles F. Hobson, Jr., Course XV, took a different tack, by not writing: "Hope to tell you in June instead of writing here and now." Charlie is with G.E. at Plainville, Connecticut.

Charles H. Hoffman, Course VI-grad, recently became Vice President in Charge of Power Pooling, for Public Service Electric and Gas Company, Newark, N.J.

John S. Hamilton, Course X, is now president of Alcoa's Wear-Ever Aluminum subsidiary, in Chillicothe, Ohio. Jack wrote: "We built a sizable plant addition, a new office building, and we seem to be making good progress in recapturing

some of the fast moving consumer cookware market. Small town life is fun. We are 45 miles south of Columbus and if any classmates are passing through, we have plenty of bunk room. Debbie will be going to Purdue next year and Susan will be a senior at Bucknell." Jack and Joan also included the following sad news about *Alva Lewis Herman*, Course VIII, who lived with a number of '39ers at the old student house at Bay State Road.

Deceased

From a clipping sent to Jack by Mrs. Florence R. Herman, Al died on January 20, after a long illness. He had been with DuPont's Experimental Station, extending applications for new heat resistant plastic materials for industrial and aerospace uses.

Another notification of death came from the Alumni Office with no further details: *Kenneth W. Root, Jr.*, Course II, of R.D. #1, Greene, N.Y. 13778, died on November 24. In the Alumni Register, Ken was listed as being a structural designer with McFarland-Johnson, Construction Engineers, Binghamton, N.Y.—*Oswald Stewart*, Secretary, 3395 Green Meadow Circle, Bethlehem, Pa. 18017

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It is with regret that I must report the death of *Richard M. Crossan* on November 30, 1968. Dick lived in Louisville, Ky., and was President of Crossan Associates at the time of his death.

John Strickland advises that he is again Regional Chairman, Seattle Region of the Alumni Association, while *Clare Milton* penned a note that he had been elected Vice President, Engineering and Development of Eastern Products Corp., a division of Roper Corp. *Joe Libsch* has been advanced to vice president for research at Lehigh University. *Herb Hollomon*, president of the University of Oklahoma has been elected president of the Mid-America State Universities Association.

Plant relocation has caused *Dick Falls* to leave his job after 23 years. "I have left M. K. M. Hosiery Mills, Inc., after nearly 23 years because the plant at Rochdale, Mass., was shut down Decem-

ber 28, 1968 and I did not wish to move to Puerto Rico with the company. I am now Superintendent at the Worcester Brush Co., of Worcester, Mass. My oldest son, Tom, and his wife presented me with a grandson last July 15. My second son, Allen, will graduate in June from New York State College of Forestry, Syracuse, where he is an R.O.T.C. Major. My third son, Arthur, will graduate from high school in June. My sons, Peter and Robert, and my daughter Janet, are in 9th, 7th, and 5th grades."

New Visiting Professorship

Karl Pfister has been elected senior vice president for development of Merck, Sharp & Dohme Research Laboratories. Previously he was vice president for development research. Karl has been with Merck since receiving his doctorate from Tech in 1942 and has done research in the synthesis of amino acids, vitamins, sulfa drugs and drugs related to mental health and the treatment of cardiovascular conditions. He is the author or co-author of 28 scientific papers and inventor on more than 40 patents. In 1964 he received the Merck Board of Directors Scientific Award for his research accomplishments. The award included a \$25,000 grant to Tech to establish the Karl Pfister Visiting Professorship. Karl, his wife and their children reside at 258 E. Dudley Ave., Westfield, N.J.

Teledyne founder

An article in *Forbes* for January 15, 1969, is about *Henry Singleton* and his development of Teledyne. The following excerpts are from the article: *You can win most of them, but you can't win them all.* *Henry E. Singleton*, a Ph.D. from M.I.T. won big in 1960, when he quit a Litton Industries vice presidency to found a company of his own. Los Angeles-based Teledyne, Inc. He talked persuasively of 'founding a great company' in the new-issue boom of that year, but Teledyne was different from most of its peers. It didn't collapse when the boom collapsed. Singleton went on to use his high-priced stock to build a multicompany, with 100 other acquisitions, ended 1968 with \$807 million in sales and more than \$40 million in net profits. At Teledyne's high, Singleton's holdings were worth \$50.4 million. . . . In May, using cash for the first time, he bought control (52% of United Insur-

ance Co. of America, a Chicago based life insurer with \$2 billion work of insurance in force and \$30 million in assets. Then, during a two-week stretch in October, he traded stock for four smallish casualty companies with assets totaling around \$215 million. . . . Why insurance, an industry whose plodding growth would lend no luster to Teledyne? His real motive for buying into insurance, says Singleton, is stability. Insurance appeals to us because of the stable, growing base it gives us to continue our growth. . . . Everybody's buying insurance companies these days, but then everybody was launching hot new electronics companies in the early Sixties. Teledyne was one of the few that really prospered and the implication is that Teledyne is one of the few that will come out on top buying insurance companies."

John F. Brauning, Jr., Samuel A. Goldblith, Joseph D. Havens, Robert S. Nedell, Louis V. Russoniello, Jacob A. Samuelson, Gary Steven, George H. Stoner, George R. Weinbrenner. For the latest address of these and other classmates write your secretary.—*Alvin Gutttag*, Secretary, Cushman, Darby & Cushman, 730-15th St., N.W., Washington, D.C. 20005

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Luke S. Hayden, president of City Savings Bank, Pittsfield, Mass., has been featured in the news as one of the few bank presidents in the U.S. who does his own airplane piloting. Luke has converted a hobby into a useful business tool. He uses his private pilot's license to fly himself to and from business conferences, real estate inspections and other pertinent bank business. Luke's flying lessons started in 1966 upon the suggestion of his wife Dorothy who is reported to have theretofore been opposed to his flying.

Within a month he was soloing, and Dorothy has since become one of his most enthusiastic passengers. Now with more than 160 hours of flying time to his credit, Luke's trips have included such populated areas as Montreal, Boston and Cape Cod. He says that Boston is an easy destination for a morning business appointment permitting him to be back at his desk in Pittsfield by noon.

Since obtaining his pilot's license, Luke has accepted a commission as Major in the Civil Air Patrol and has been appointed Project Officer for the Pittsfield Composite Squadron. In this connection he has already raised enough money to purchase a new radio transmitter and receiver for the squadron's L-16 observation plane and to have the Civil Air Patrol's base station overhauled and put back into service. He is now reputed to be in pursuit of a building suitable for use as a hangar to store the Civil Air Patrol plane or funds to build one. Thanks are extended herewith to Ivor Collins for bringing the above to our attention.

Rogers B. Finch, director of academic

planning at the Rensselaer Polytechnic Institute, was carried in the R.P.I. Alumni News of February, 1969, as stating in reference to the 317 acres of academic areas in Troy, including a 65 acre Menands estate just bequeathed to R.P.I., that "Whatever use is made of the property, the acquisition is part of a continuing growth pattern aimed at improving the quality of a Rensselaer education. The changing campus reflects the dynamic nature of R.P.I. as the university approaches its 150th year."

Mason L. Downing has been named a chief project manager in the Esso Engineering Petroleum and New Investments Department of Esso Research and Engineering Company, principal scientific and engineering affiliate of the worldwide Esso organization. Mason joined the company in 1947 as an engineer in the old Engineering research Division following five years service in the U.S. Army during World War II. He became group head in Engineering Research in 1951 and then group head in the former Engineering Development and Process Design Division. In 1954 he was named an assistant staff engineer. After serving on startup assignments at affiliate companies' refineries, he was appointed a staff engineer and then began a 2½ year assignment in Paris as staff engineer for activities in Belgium, France and Italy. He was named chief staff engineer in 1962 and associate director of Project Management in 1964. From 1965 to 1967 he served as project manager of two affiliate projects before becoming manager of the Chemicals Department. He was named acting assistant general manager of his present department last year. He received both his B.S. and M.S. degrees in chemical engineering from M.I.T. He and his wife, Beverly, have three children and reside at 17 Olmstead Road, Morristown, N.J.

Nathan R. Owen, chairman of General Signal Corp., was recently elected a director of the Great Northern Paper Co., New York.

"Gaplash"

Albert H. Bowker, chancellor of the City University of New York, delivered the dedication address in dedication ceremonies of the new Newark campus of Rutgers University. In his address he stressed the dependence of publicly-supported colleges upon decisions of elected legislators and outlined the problem of what he termed "gaplash," which he defined as the growing "gap between reason and action in our society."

—*Walter J. Kreske*, Secretary, 53 State St., Boston, Mass. 02109; *Everett R. Ackerson*, Assistant Secretary, 831 Cranford Ave., Westfield, N.J. 07090; *Michael Driscoll*, Assistant Secretary, 63 Center Street, Nantucket, Mass. 02554

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February 24, while I was in Chicago, I called *Lewis Tyree* to get a report from that area. Fortunately, he wasn't home so I had a delightful talk with his wife. She was getting the household ready for a big move in March—four blocks away. It seems that Lew is out in the cold these days as a result of his development of a technique for making dry ice tablets. Besides a contract from Swift in Minneapolis, he has been negotiating with the aircraft manufacturers to place his equipment in the galleys of the new jumbo jets. On the side he acts as an Educational Counselor. Mrs. Tyree turned out to be very enthusiastic about M.I.T. not only because she married an M.I.T. man and used to live in Boston, but also because she is the sister of *Richard Hinchcliff*, XVI, of our Class.

Sometime ago I received information on our classmates who were on the Middlebury-M.I.T. cooperative plan. *Peggy Bowles Smith*, XVI, and family were back in Guilford, Conn., hoping never to move again. She had a part time job calculating for a land surveyor. One son, David, 21, was at Colorado College but she gave no information on the other three: Jeffrey, 24, Jared, 19, and Nancy, 15. *Ralph Barclay*, II, is at the N.A.S.A. Goddard Space Flight Center and lives in Bowie, Md. The Barclays have two sons ages three and five. Ralph did most of the dynamics analysis for the antennas on the successful Radio Astronomy Explorer Satellite. *Page Ufford*, X, was still in Newark, Del., as a Design Project Manager in duPont's engineering department. With sons 18 (John) and 13 (Robert) he must have his hands full solving his version of the generation gap. I myself was in this group which transferred in the Junior year. Occasionally I get to see Ralph since we are both in the space business. As Senior Scientist in the Systems Science Research Division of I.I.T. Research Institute, I am engaged in analyses of Earth Resources Survey Satellites for NASA Headquarters. This is a fascinating combination of high technology with old-fashioned earth-based problems in the areas of agriculture, water resources, mineral resources, land use, meteorology, and oceanography. Since some of the work concerns the interface between the physical and social sciences, there is a challenge to my background in engineering (M.I.T.), liberal arts (Middlebury), and administration (American University).

Paul Robinson called me to state he had a letter from *Robert Copsey*, XV, who also is in the space business. Bob is at the Aerospace Corp., in L.A. and has had the satisfaction of working on the U.S.A.F. Tactical Communications Satellite from the concept in 1965 through the construction and successful flight this February 9. He was present at the launch and his company received a commendation from the

FIFTH ANNUAL TOUR PROGRAM—1969

This unique program of tours is offered to alumni of Harvard, Yale, Princeton and M.I.T. and their families. The tours are based on special reduced air fares which offer savings of hundreds of dollars on air travel. The tour to India, for example, is based on a special fare, available only to groups and only in conjunction with a tour, which is almost \$400 less than the regular air fare. Special rates have also been obtained from hotels and sightseeing companies. Air travel is on regularly scheduled jet flights of major airlines.

The tour program covers four areas where those who might otherwise prefer to travel independently will find it advantageous to travel with a group. The itineraries have been carefully constructed to combine the freedom of individual travel with the convenience and saving of group travel. There is an avoidance of regimentation and an emphasis on leisure time, while a comprehensive program of sightseeing ensures a visit to all major points of interest. Hotel reservations are made as much as a year and a half in advance to ensure the finest in accommodations.

THE ORIENT

30 DAYS \$1569

Mar. 22, Jun. 28, Jul. 26, Sept. 20

1969 will make the fifth consecutive year of operation for this fine tour, which offers the true highlights of the Orient at a sensible and realistic pace. Eleven days will be spent in JAPAN, divided between TOKYO, the ancient "classical" city of KYOTO, and the FUJI-HAKONE NATIONAL PARK, with excursions to NARA and NIKKO. Five days will be spent in HONG KONG and four in the fascinating city of BANGKOK. Shorter visits to SINGAPORE and the lovely island of FORMOSA complete the itinerary. Optional pre and post tour stops may be made in HONOLULU and the WEST COAST at no additional air fare.

A complete program of sightseeing will include all major points of scenic, cultural and historic interest. Features range from a tour of the canals and floating markets of Bangkok, an authentic Javanese "Rijst-tafel" in Singapore, and a launch tour of Hong Kong harbor at sunset, to a "Mongolian Barbecue" in Taipei, and a trip on the ultra-modern 125 m.p.h. express trains of Japan.

Tour dates have been chosen to coincide with outstanding seasonal attractions in Japan, such as the spring cherry blossoms, and beautiful autumn leaves, and some of the greatest annual festivals in the Far East. Total cost is \$1569 from California, \$1739 from Chicago, \$1807 from New York. Special rates from other cities.

INDIA

Including NEPAL and PERSIA

29 DAYS \$1636

Mar. 15, Mar. 22, Aug. 2, Oct. 4

An unusual opportunity to see the diverse and fascinating subcontinent of



India, together with the once-forbidden kingdom of Nepal and the rarely-seen splendors of ancient Persia. Here is India from the mighty Himalayas to the palm-fringed Bay of Bengal; the great seaport of BOMBAY; the magnificent cave temples of AJANTA and ELLORA, whose thousand year old frescoes are among the outstanding achievements of Indian art; MADRAS, in the south; the great industrial city of CALCUTTA; a thrilling flight into the Himalayas to KATHMANDU, capital of NEPAL, where ancient palaces and temples abound in a land still relatively untouched by modern civilization; the holy city of BENARES on the sacred River Ganges; AGRA, with not only the Taj Mahal, but many other celebrated monuments of the Moghul period such as the Agra Fort and the fabulous deserted city of Fatehpur Sikri; the walled "pink city" of JAIPUR with an elephant ride at nearby Amber Fort; the unique "lake city" of UDAIPUR, with its delicate white marble palaces; the great capital of NEW DELHI; and the fabled beauty of the VALE OF KASHMIR, surrounded by the snow-clad Himalayas. PERSIA (Iran) includes visits to PERSEPOLIS, the great royal capital of Darius and Xerxes in the 5th century B.C.; and ISHFAHAN, the fabled city of the 15th-17th century Persian Renaissance, with its palaces, gardens, bazaar, and famous tiled mosques. Outstanding accommodations include hotels that once were palaces of Maharajas and luxurious houseboats on Dal Lake in Kashmir. Total cost is \$1636 from New York.

SOUTH AMERICA

31 DAYS \$1599

Jan. 18, Jul. 26, Oct. 18

An original itinerary which takes unusually full advantage of South America's great scenic and cultural attractions. The trip descends along the West Coast, dominated by the towering Andes and filled with the churches and mansions of 16th and 17th century Spain, and returns through the modern cities and lush scenery of the East Coast. Stops include Spanish colonial QUITO, with the nearby Indian market at AMBATO and a drive along the snow-capped peaks of "VOLCANO ALLEY"; Pizarro's great viceregal capital of LIMA; the ancient city of CUZCO and the fabulous "lost city" of MACHU PICCHU; lovely SANTIAGO in Chile; cosmopolitan BUENOS AIRES, the continent's largest city; BARILOCHE, in the beautiful ARGENTINE LAKE DISTRICT; spectacular IGUAZU FALLS (largest in the world); the sun-drenched beaches of RIO DE JANEIRO (considered by many the most beautiful city in

the world); the quaint and historic town of OURO PRETO (so revered by Brazilians that the entire town is preserved by law as a national museum); the striking contemporary architecture of BRASILIA; and PANAMA CITY with the Panama Canal, Spanish ruins, and free-port shopping. These great points of interest are complemented by an assemblage of South America's truly outstanding hotels. Total cost is \$1599 from New York. Special rates from other cities.

EAST AFRICA

22 DAYS \$1549

Jul. 14, Jul. 28, Sept. 22

A luxury "safari" to the great national parks and game reserves of Uganda, Kenya and Tanzania. These offer a unique combination of magnificent wildlife and breathtaking natural scenery: great herds of elephant in QUEEN ELIZABETH PARK, in the shadow of the fabled "Mountains of the Moon"; a launch trip on the White Nile through hippo and crocodile to the base of the thundering MURCHISON FALLS; multitudes of lion and other plains game in the famous SERENGETI PLAINS and the MASAI-MARA RESERVE; the spectacular concentration of animal life in the NGORONGORO CRATER; tree-climbing lions around the shores of LAKE MANYARA; and the AMBOSELI RESERVE, where all types of big game can be photographed against the towering backdrop of snow-clad Mt. Kilimanjaro. Air travel is used where possible, enabling longer stays within the parks. Also seen are the fascinating capital cities of KAMPALA, NAIROBI and DAR ES SALAAM, the exotic "spice island" of ZANZIBAR, and the historic MOMBASA, a beach resort on the Indian Ocean, with its colorful Arab quarter and great 16th century Portuguese fort. Tour dates have been chosen for dry seasons, when game viewing is at its best. The altitude of most areas provides an unusually stimulating climate, with bright days and crisp evenings (frequently around a campfire). Accommodations range from luxury hotels in modern cities to surprisingly comfortable lodges in the national parks (some equipped even with swimming pools). Total cost from New York is \$1549.

Rates include Jet Air, Deluxe Hotels, Meals, Sightseeing, Transfers, Tips and Taxes. Individual brochures are available on each tour.

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Air Force. Bob reports he will be at the reunion.

Paul Heilman, XV, sent Robinson a note with an article from the Bridgeport, Conn., *Post* reporting that Paul had been made Product Sales Manager (Forgings) at the Bridgeport Brass Co. He has also agreed to serve another three years as educational counselor for the Westport and Norwalk areas. The whole Heilman family will be at the reunion along with the *Sam Morrisons*, XIII, *Lavedos*, and *John Fries*, III.

Two of our class made the *Wall Street Journal* in January. *Gerald Dennehy*, II, has been admitted as a general partner in *W. E. Hutton & Co.*, in New York. *Jack E. Sonnenblick*, XVII, vice president of *Sonnenblick-Goldman Corp.*, was elected to the Board of Trustees of North American Mortgage Investors, of New York. Jack's company is a mortgage-brokerage concern which is North American's advisor.

Another of the class engaged in the financial business is *Clyde C. Snyder*, XV. He was appointed a vice president of Fiduciary Trust Co., of New York in January. After receiving his S.B. at M.I.T., Clyde got his M.B.A. from Harvard and an M.A. in Economics from Columbia. In 1964, he joined Fiduciary as a security analyst responsible for research in the area of drug, hospital supply, cosmetics, and electronics. He was appointed an assistant vice president in July 1968.

Alan S. Michaels, President of Amicon Corp., presented a paper at the Electrochemical Society titled, "Electroconductive and Dielectric Properties of Polyelectrolyte Complexes and Other Membrane Structures." Alan received his S.B., M.S. and S.D. in chemical engineering at Tech. He joined the M.I.T. faculty and became a full professor in 1961. His academic research and teaching have been concentrated on polymeric materials and engineering applications of surface and colloidal phenomena. Alan has served as consultant to many U.S. corporations, to the President's Science Advisory Committee, and to the Office of Saline Water. In 1962 he organized Amicon Corp., became its president, and has devoted full time to it since 1966.

Earle B. Hodgdon, V, was Associate Chairman for publicity at the first Northeast Regional Meeting of the American Chemical Society. Apparently the meeting was a great success because, at the final meeting of the Operating Committee on December 3, 1968, the problem was how to allocate the extra funds they had on hand. Being conservative scientists, they put it aside for the next meeting in Providence in 1970. *John G. Barmby*, Substitute Secretary in lieu of: *Paul Robinson*, Secretary, Information Systems Div., Navy, OP-914H, Pentagon, 2B330, Washington, D.C. 20350

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Of the 10 or so classmates assigned the important duty in March of writing their secretary, only two have replied, *Bob Fried* and *Roger Bart*. Both wrote very fine reports and we wish to thank both of them. As Bob Fried's letter arrived a few days ahead of Roger's we will begin with Bob's.

Bob and his lovely wife, and his four children live in Staatsburg, N.Y., an unspoiled hamlet near Poughkeepsie. There are people who believe that Bob settled near Poughkeepsie after meeting Vassar girls during college days. Let me make it clear that this is not true. Bob believes in Staatsburg because that is where his family settled soon after Bob, his dad, and brother had driven out the Mohawk Indians.

Bob and his family live in a grand big house on a lovely lake back in the hills outside of Staatsburg. It takes Bob just ten to fifteen minutes to drive to work. His work is as President of the Now Corporation which has three small divisions manufacturing metal parts for aircraft and electronic customers, accessory products for paper and chemical companies and Teflon cookware which they market. Their 1969 orders indicate tremendous growth and Bob reports they are suffering real growing pains. These reasons and the question of the long term survival problems of small companies have caused him to work on plans to tie into larger organizations.

Bob has not neglected advanced studies as he is now completing his dissertation for a Doctorate in Corporate Planning at Columbia University. Bob also is a lecturer on planning for the President's Association of the American Management Association.

During the past year Bob and his family took a trip to Venezuela which they enjoyed very much. Part of the trip included travelling up the inland rivers in Cones. A frightening thing happened on one trip when Bob fell into a piranha infested river. Fortunately Bob, who was always able to take care of himself at meal time, was able to devour thirty or more of the little devils before the rest of the piranhas could escape.

Roger Bart has written from his home in Princeton, New Jersey. Roger and his wife, Elaine (Elaine Bickford Class of '45) and four children live at 4345 Provincetown Road. The children range in age from a junior in high school to a first grader. Now that the children are all in school, Elaine is teaching in the Princeton School System. Roger is Assistant Director of Research and Development with Union Camp Corporation. They began this research and development organization a little over five years ago and now have a staff of over 100 people who have some very exciting work under way.

A note from *Samuel Gusman* tells us he has been Vice President of Warren-Teed, the pharmaceutical subsidiary of Rohm & Haas in Columbus, Ohio, since his graduation from graduate school. . . . *W. D. Nolte*, of 95 Red Oak Road in Fairfield, Conn., has been named the director of distribution for the Business Machines Division of the Dictaphone Corporation.

New Homework Assignments

The following class members are assigned the task of writing the secretary on their activities. *John L. Wandrisco*, *George B. Bailey*, *Richard L. Ballman*, *David G. Black, Jr.*, *Morris A. Chomitz*, *James W. Church*, *Richard H. Doyle*, *Paul S. Munn*, *Wm. L. Shea*, *Robt. D. Zucker*, *Antonio C. Nunes* and *Peter L. Richman*. Best to all until next time.—*Russ Dostal*, Secretary, 18837 Palm Circle, Cleveland, Ohio 44126

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The notes are due a bit later than usual this month, so I am with you after a very pleasant skiing sojourn in Aspen, Snowmass and Vail. On the way out I spent a few hours with Kathleen and Bob Frenzell, '48, also on their way to Aspen. Strange as it may seem the last time I saw Bob was back in our bachelor days when *Parker Symmes*, Stu Edgerly, '46, he and I were part of a group that flew the first ski charter to Europe. Ran into Milt Bevington, '49, in Snowmass—no classmates encountered on the trip.

Deceased

The first note of the month is a sad one from Janie Castles informing that her husband *John T. Castles*, who received his masters with us, suffered a fatal heart attack in January. He had just previously been named a vice president of General Electric. I know all of our sympathies are with Mrs. Castles.

Walt Kern, now with Teradyne in Boston as chief mechanical engineer, advises that one of his interests is the A.F.S. Student Exchange. I spent some time this winter skiing with the the A.F.S. students here and will have to agree that it is a program that is catching our family interest. . . . *Bob Whorf* is now with the transportation Research and Planning office of Ford in Dearborn. . . . From the clipping services we find that some of our membership have been hard at work. *Bob Rediker* was the recipient of the I.E.E. annual David Sarnoff Award. Mr. Rediker is professor of electrical engineering at the Institute and received the award for his extensive research in electronic devices made from semiconductor materials. . . . *Herbert Wolfe* has been appointed Western district manager for industrial environmental control equipment by Dravo Corp., of Pittsburgh. In this position he will be based in Phoenix, Arizona. That pretty well cleans out the file for this month so I'll have to go to work. Will appreciate hearing your news so do write.—*Dick O'Donnell*, Secretary, 28516 Lincoln Road, Bay Village, Ohio 44140

Through a distressing mix-up which never should have happened, I reported, in the December issue, the untimely death of *Harold Humes, Jr.* Actually, Harold is alive and well and living in New York. I found out about this through a letter from *Andy Lang* of Boundary Lodge, Bray Road, Maidenhead, England to whom I extend my thanks. How do these things happen? I suspect as follows: Harold Humes, Sr., Class of 1922, did indeed pass away in the past year. But the letter from his estate which was forwarded to me should, obviously, have been forwarded to the secretary of the Class of 1922. I am very sorry for any distress which this may have caused.

Last night at the Alumni Council meeting, I fell to chatting with *Herb Spivack* who had realized a long-standing ambition by finding the time from his booming plastics business to drive up from Rhode Island to attend the session. At one point, I said to Herb: "I haven't the foggiest idea if *anybody* ever reads these notes." "Well," said Herb, "I never get to read them because I'm too doggone busy! But," said he, as he saw my face fall, "my faithful wife, Gloria, Always reads them to me." So, Hi there, Gloria, bless your heart! I promised Herb I'd include a greeting to you in this column.

Once again a dozen men have dropped notes to me regarding their doings. You will just never know how pleased I am to get them. *William S. Hutchinson, Jr.*, writes a note in which I suspect a lot is written between the lines. See what you think. He says: "Now practicing military systems engineering in South East Asia." *Orlien N. Becker* reports that he has three boys and a girl and is President of Pacific Technology, Inc.—a small electronics company (23 employees) located in Seattle. *Lucas B. Mayer* writes that he is Deputy Commander at the San Francisco Bay Naval Shipyard and asks that his best regards be extended to Dean Horn who was his classmate in Naval Construction and Engineering. Dean is now at Tech.

Axel Kaufmann is happily living in Newton Highlands with his wife Marion and daughters Laurie (4½) and Jessie (2½). He established his own architectural firm in mid-1965. *William R. Kincaid* is taking time off from work at the Ingersoll Milling Machine Co. in Rockford, Ill. to work for his master's degree in business administration at the University of Chicago. He goes to school one full day each week on alternate Fridays and Saturdays. *Frederick W. Reusswig* reports that Mike, his No. 1 son, is married and in the Air Force while No. 1 daughter, Pat, is at college. He says further that he heard Hunter Rouse, '29, give an excellent talk on engineering education in which he mentioned M.I.T. Fred states that Dr. Rouse is doing an exemplary job as Dean of Engineering at the University of Iowa. His talk concerned the enlarging circle of activities and in-

terests with which the scientists and engineer must be concerned, i.e., his talk was society and systems oriented. In private practice, says Fred, such concern is increasingly needed to develop responsive projects.

David R. Israel left his position as Technical Director of MITRE Corporation in Bedford, Mass., to join the Defense Communications Planning Group of the Department of Defense housed in the U.S. Naval Observatory in Washington, D.C. He is currently Deputy Director, Engineering, and involved in projects related to military activities in Southeast Asia. . . . *David C. Moore* tells me that he has a new home and a new job as Program Manager "In-Cities" Project, Office of Urban Technology and Research U.S. Department of Housing & Urban Development. He has four children: boys 14, 12, and 1; and a girl who is 11. He hopes to get to Bermuda. *Leland L. Estes, Jr.*, Ph.D. V, is not Director of Publicity somewhere (the writing was obliterated) as reported in a recent *Review* but is, instead, with duPont's Old Hickory Nashville, Tenn., location and has been since 1965 as a Senior Supervisor of R&D. As a matter of fact, he has been with duPont since 1949.

Lieutenant-Colonel *Herbert M. Federhen* is now stationed in the Washington area working with the Defense Communications Planning Group and living in Arlington, Va. At the time of his note, he had recently seen *Dave Moore* (mentioned above) and *Jerry Lewi* and reports them alive and well. *Walter E. Seibert, Jr.*, says, "I moved back (from Mexico) to the United States in early 1968 and live with my family in Teaneck, N.J. I am working in New York City for Parsons-Jurden Corporation, one of the largest engineering and construction companies in the world. I have been working on feasibility studies of new mineral projects. After 16 years, we are all very happy to be back in the U.S.A."

Stanley N. Kuryla has recently been promoted to the position of Special Market Operations Manager, Ford Division, Ford Motor Company. He lives with his wife Beverly and their five children in Bloomfield Hills, Mich. . . . *Gordon Raisbeck*, Ph.D. XVIII, has been elevated to the grade of Fellow in the I.E.E.E. The grade of Fellow is the highest membership grade in the I.E.E.E., and is attained by invitation only. A mark of unusual distinction, it is conferred only upon persons of outstanding and extraordinary qualifications in their particular fields. Dr. Raisbeck's citation reads: "For contributions and leadership in research on communication theory, transmission line theory, and transistor circuits." *David B. Kellom* has been promoted to the position of senior patent agent at the Dow Chemical Company in Midland, Mich., in recognition of his expanding responsibilities and increased independence in performing his patent functions. Dave joined Dow as a chemist in 1953, entered the Patent Department in 1962 and became registered as a patent agent in



B. D. Gavril, '49



T. C. Buchanan, '50

1963. He holds a B.S. in chemistry from Tech, a master's degree in organic chemistry from Columbia and a doctorate from the University of Illinois.

The photo of *Bruce Gavril* above was not available at the time we reported his receiving a \$1,000 Outstanding Contribution Award from IBM's Data Processing Division. He received the award for his role as "architect" in the development of a Special Control Unit known as the IBM 2903. A description of the 2903 appeared on page 139 of the March issue. —*Fletcher Eaton*, Secretary, 42 Perry Drive, Needham, Mass. 02192

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Gerard A. Hirschfield is currently Manager of the Space & Range Systems Department at System Development Corp., in Santa Monica, Calif. He and his family moved to Woodland Hills about two years ago. His family took a Caribbean trip this past summer—Puerto Rico, V.I. and Jamaica, and are ready to go back anytime. . . . *D. F. Taylor* is now Director, Community Planning Branch, Ontario, Department of Municipal Affairs. He is also engaged in substantial changes in the local government structure of Ontario, establishing of regional governments. He says the U.S. can learn a great deal by watching Canadian developments in this field. . . . *J. P. McCluskey* was recently named Superintendent of Commonwealth Edison's Ridgeland generating station in Stickney, Ill. . . . *Robert W. Roig* is presently employed by the General Research Corp., in Santa Barbara.

The Rev. *Richard N. Bolles* is now Western Area Executive Secretary for Ministry in Higher Education of the Episcopal Church (a territory including all college campuses from Idaho to the Philippine Republic) and a member of the National Staff of United Ministries in Higher Education, comprised of 10 communions (all the main Protestant ones, except the Lutherans) in a cooperative arrangement. . . . *August P. Doering* has three Children, Douglas, 14; Kevin, 11 and Tracey, 9. He is presently employed by National Starch and chemical Corp.,

where he is in charge of basic product development for the Textile Department *Daniel E. Flanders* is Chief of Material Systems at General Dynamics Convair in San Diego, Calif. He and his wife, Vicki, have two children, Danny, Jr., 6, and Barbara, 16.

Harry F. Raab, Jr., has been at the Bettis Atomic Power Lab, of Westinghouse Electric Corp., since he graduated. After 3 years in reactor control system development, he spent a year at the Oak Ridge School of Reactor Technology and has worked in reactor physics ever since. From 1956 to 1958, he supervised the nuclear design of the first cores for the U.S.S. *Enterprise* and U.S.S. *Long Beach*. For the past six and a half years he has been Manager of Physics, Light Water Bleeder Development Program. . . . *Thomas C. Buchanan* has been appointed Field Sales Manager of The Milford River & Machine Company in Milford, Conn. . . . After spending 17 years in Portland, Ore, as Production Manager of Portland's newspapers, *Donald R. Newhouse* has returned to Massachusetts with his 5 children, ages 9 to 17. (The one boy is 9.) As General Manager of the Springfield newspapers, Don is deeply involved in building a new plant to house the three papers.

Herbert P. Sontag has been named to head the newly-formed Professionals Data Service Division of Practice Development Associates, of Lafayette, Calif. He resides in Lafayette with his wife and three children. Practice Development Associates, Inc., is a management consulting firm, specializing in dental and medical practices throughout the West. . . . *Paul Blasinggame*, General Manager of General Motors AC Electronics Division, Milwaukee, Wisc., received the National Aeronautics and Space Administration's public service award on January 13, in ceremonies at N.A.S.A.'s Manned Spacecraft Center in Houston, Texas. The award is the highest N.A.S.A. can bestow on a civilian outside of government service and is given to individuals from organizations that service N.A.S.A. as contractors, in recognition of significant contributions to the space program. . . . *Thomas Howitt, Jr.*, was recently elected Vice President of the Corning Glass Works in Corning, N.Y.

After spending 18 years in the Philadelphia area, *Allen E. Bryson* moved, in September, to Wilton, Conn. Change was occasioned by Atlantic Richfield's move of headquarters to 5th Ave., in New York City. Effective 11/1/68, he was promoted to Manager, Forward Planning Products Division. . . . *Richard C. Lesser* is now Statewide Coordinator of New York State for the Educational Information System.

C. G. Manasse and his wife, Ellen, had a son, born on April 27, 1968. Since May he has been with the Hazeltone Corp., at Little Neck, L.I., electronics manufacturer, as head of the Staff Accounting Department. . . . *David B. McLeod* was a member of the 54th Ad-

vanced Management Program at the Harvard Business School graduating in December, 1968. . . . *Edward T. Tracey* is now Project Engineer for Anderson-Nichols & Co., Inc., in Boston, Mass.

Alfred M. Petrofsky is now a partner in Jacobs Associates, Consulting Construction Engineers. His family of three children is due to increase to four in March. He says he may have been a slow starter but he will still get there. . . . *Raymond C. Quick* has been named Manager of the Prototype Fabrication Center at Raytheon Company's Missile Systems Division Laboratories, Bedford, Mass.

Automatic Control Devices Inc., has announced the appointment of *Eugene R. Ganssle* as Vice President and Manager of its Rockville, Md., activities. Automatic Control Devices is a subsidiary of the Neotec Corp. Its charter is research, development, and sales of unique electro-optical instruments for use in industrial quality and process control applications. In his new position, Mr. Ganssle will direct both the development and sales activities of the corporation. . . . *Emile F. Harp* joins Armour Industrial Chemical as Director of Engineering in Chicago.

Richard E. Henning, Jr. of Arlington, Va. and *Gary J. Cantwell* of Endicott, N.Y., are incoming students at M.I.T. Their fathers are Captain *Richard E. Henning* and *Robert J. Cantwell*, respectively.

Harry G. Foden, Group Executive, Corporate & Public Management Div., Arthur D. Little, Inc., graduated from the 54th Session of the Advanced Management Program of the Harvard University Graduate School of Business Administration. . . . *Frederic C. Wood* spoke on "Controlling Construction Costs" at the 20th Annual American Institute of Steel Construction National Engineering Conference in 1968. . . . *Donald R. Miller* has been elected to the vice presidency of Cresap, McCormick & Pageant in New York.

Deceased

We regret to inform you of the death of *Frederick W. Corder* on January 5. Fred resided in Vernon, Conn. We extend our deepest sympathies to his family.—John T. McKenna, Jr., Secretary, 2 Francis Kelly Rd., Bedford, Mass. 01703

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Lee Brodsky, following family tradition, is Vice President at Hudson-Shatz Painting Co. His father, Saul, also an M.I.T. man, was owner of the Hudson painting Company before merging with Shatz. If you want your house painted, don't call Lee: he is busy painting buildings like the Empire State, Metropolitan Life, N.Y. Life, RCA, and Yankee and Shea Stadiums (or Stadia as the case may be). . . . *Priscilla (Maurer) Burrage* is manager, technical communications and publications at I.B.M. Burlington, Components

Division in Essex Junction, Vt. Her husband, Peter, is also with I.B.M. and Manager of Product Engineering. They are enjoying sailing and skiing in Vermont. . . . *Edward Candidus* has joined Jack Carpenter at American Science & Engineering, Inc., in Cambridge, Mass.

Albert Cohen, president of Electronic Space Structures, Corp., (ESSCO) is taking the diversification by acquisition and merger route. Their subsidiaries now include ANTLAB, Inc., Communications Structures, Inc., and recently, Applied Microwave Laboratory. ESSCO manufactures antennas radome structures and microwave components. . . . *Ramon E. Colon* is with General Electric, Aircraft Engine Technical Division, in Evandale, Ohio. He and Kathryn have three girls: Mary 16, Kathryn 15, and Ellen 8.

Home from Vietnam

Lieutenant colonel *Frank Davis*, U.S. Army Signal Corps, was in Vietnam for two years and was awarded the U.S. Legion of Merit, the Vietnamese Armed Forces Honor Medal first Class, and the U.S. Joint Service Commendation Medal for exceptionally meritorious service. Since returning from Vietnam, he has served as Deputy Chief, System Engineering Division, in Springfield, Va. and has attended the Air War College at Maxwell Air Force Base, Alabama. Frank was an honor military graduate in the M.I.T. R.O.T.C. program and is a graduate of the Army Command and General Staff College at Ft. Leavenworth, Ky. Frank and Terry have four children: Paul 10, Kelly 9, Theresa 7, and Christopher 4.

Russell Casella is a theoretical physicist at the National Bureau of Standards (U.S. Department of Commerce), in Washington, D.C. Some of his recent work demonstrated that the time reversal symmetry principle of physics can be violated, for example by "slow" nuclear K⁰ meson decays. . . . *Donald De Muzio* is department head, manufacturing development engineering at Western Electric Co., in Reading, Pa. On winter weekends, Don and his children: Anne, 11, Dave 9, and Beth 4 can be found at Sharp Mountain ski area where Don has been ski patrol leader for five years.

Two of our graduate student classmates have achieved some prominence: *Hans Eichenberger*, Sc.D. II, is now Director of the I.B.M. Zurich Research Lab (he had been Director of Research at Ingersoll Rand Research Labs in Princeton, N.J.), and *Josef Eisinger*, Ph.D. VIII, was noted for work performed with colleagues on The DNA molecule which is sometimes called the key to heredity. . . . *Merton Flemings* has invented a new premium aluminum casting alloy in cooperation with Bendix Corp. The alloy, designated as ST-60, has superior properties for such applications as impellers in diesel Engine turbochargers. Mert is still on the faculty at M.I.T.

Richard Hare has moved from Cleveland to East Greenwich, R.I., to join the research division of Leesona Corporation



H. Eichenberger, '51 F. J. Davis, '51

in the newly created position of Manager, Research Administration. He and Joan have two children, Debbie 10, and Nancy 7. **Thomas Hoffman**, SM II, manager of the Smithsonian Astrophysical Observatory engineering department was given a Smithsonian Institution Sustained Superior Performance Award for his designs and engineering of instruments for probing space. . . . **Carl Huntsinger** has been named Vice President and General Manager of Vetco Offshore Industries, formerly Ventura Tool Co.

Joseph Iannicelli represented M.I.T. at Georgia College and **Breene Kerr**, fulfilled this function at the inauguration of J. Herbert Hollomon '40, as President of the University of Oklahoma. Breene is also a member of the Alumni Fund Board. . . . **Carl J. Liswith** has been promoted from marketing manager to program administrator at the White Plains Data Processing Headquarters of I.B.M. He and Marion have three sons: 13, 11 and 5½. . . . **William Maini** is president of Symmes, Maini & McKee, Inc., architects and engineers. He is a former director of the Massachusetts Building Congress, and a member of the National Panel of Arbitrators, and faculty member of the Boston Architectural Center.

James McKenna has been with Bell Labs since 1960. His research has been in the area of quantum mechanics and classical Electromagnetic theory. Jim received a Ph.D. in Math at Princeton after his graduation from Tech. . . . **Frederick McCauley, Jr.**, has been appointed Assistant Plant Manager of the newly constructed Alemania Plant of Hercules, Inc. The Plant will manufacture methanol. . . . **Robert G. Norton** has been named general Manager of Cabot Engineering Co., Pampa, Texas.

Robert J. Pelletier is a research associate with the department of Architecture at M.I.T. and is presently consulting on the story addition to the Yale Medical Center which will house their new Laboratory of Surgery, Obstetrics, and Gynecology. Bob has worked on a number of hospital designs in New England and New York. . . . **John W. Roy** is with Allied Chemical Corp., Morristown, N.J. He and Betty have three sons: Kevin 15, Robert 12 and Eric 3. John reports

that being church treasurer and coin collecting are among his hobbies. Any conflict of interest there? . . . **Roger L. Schonewald** has joined the staff of Ingersoll-Rand Corp., as new product planner. The Schonewalds live in Belle Mead, N.J. and have two sons, ages 11 and 7, and a daughter 5. . . . **Dave Ragone** was in Cambridge recently in his new role as Associate Dean of the School of Urban and Public Affairs at Carnegie-Mellon Institute. Dave was at a meeting with former Boston mayor (now on the M.I.T. faculty) John Collins. Normally we don't divulge our source of news, but in this case it gives us another item: **Fred Lehmann** is on the visiting committee for the Development Division at Carnegie-Mellon, consequently he and Dave have crossed paths several times.

Authors

Bernard P. Spring, Course IV-A, a senior research architect at Princeton, is co-author with the dean of Princeton's School of Architecture of a research in education report. The work was the result of a two year research project sponsored by the A.I.A. . . . **Herbert Woodson**, Professor in the M.I.T. E.E. Department took his sabbatical leave several years ago to work as a staff engineer for American Electric Power Service Corp., co-authored papers relating to insulation of high power rotating electrical machinery and standards for testing insulation, and returned to M.I.T. to become the Philip Sporn Professor of Energy Processing. He and Blanche and their three boys (ages 7, 9, and 11) have moved into the house master's suite in Burton-Connor Hall and Herb says it's a great source of baby sitters! . . . **Charles A. Whitney** was promoted to full Professor of Astronomy at Harvard University. In addition to his teaching duties he manages to find time to write articles for Sky and Telescope, and is a physicist at the Smithsonian Astrophysical Observatory.

President of the American Association of Contamination Control, Boston Chapter, is Robert Schiesser, Course II. Bob is with the M.I.T. Instrumentation Lab. . . . And a late election return: **Alfred Wheeler** ran for State Representative in Texas as a Republican in rather staunchly Democratic territory as was reported earlier in the Review, but to the dismay of all of us, we have just learned that his opponent won. Al wrote that "this was not unexpected, but we Republicans in Texas are working for the two party system here, and I hope I helped the cause along." Al recommends involvement in politics (local, state or national) to learn about laws and law-making and people. It was a nice letter Al, and we wish you success in the future. Now all you classmates in District 41—get out and vote, and vote often. By the way, Al is a staff engineer with Elcor Chemical Corp., in Midland Texas. He is married to the former Pearl Weerts, and they have two Children: Steven 6, and Valeta 4.—**Paul G. Smith**, Assistant Secretary, 11 Old Farm Rd., North Caldwell, N.J. 07006; **Howard L. Livingston**, Secretary, 358

Emerson Rd., Lexington, Mass. 02173; Assistant Secretaries: **Marshal Alper**, 1130 Coronet Ave., Pasadena, Calif. 91107; **Walter O. Davis**, 346 Forest Ave., Brockton, Mass. 02401

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Attend Your Class Reunion

June 13-15, 1969

Jug End Inn

South Egremont, Mass.

For further information contact **Robert D. Warshawer**, 11 Tower Rd., Lexington, Mass. 02173

Charles Burnham has been elected Professor of Mineralogy at Harvard University on the faculty of Arts and Sciences. Dr. Burnham lives in Acton. . . . **James K. McCauley** has been appointed vice president of research development and engineering at Crucible Steel Corporation. He has been director of development since 1965, and is the author of many technical papers on steelmaking, solidification, and heat transfer. The McCauley's and their two children reside in Coraopolis, Pa.

Leon Pocinki has recently joined Geomet, Inc., in Rockville, Md., as Director, Resources Systems Division. He reports that "Geomet is now a little over a year old and is in everything. . . . from cloud physics to the artificial heart program." Leon recently completed a tour with the Marine Commission of which Dr. Stratton was chairman. **John Preschlack** has been living and working in Dusseldorf, Germany since late 1967, as a Principal with McCinsey and Company, Inc., management consultants. He expects to return to their New York office in the fall of 1970. **Andre Sampou** has been appointed manager of manufacturing at the Instron Corp., Canton, Mass., where he will be responsible for all phases of manufacturing for the entire product line. He was formerly vice president of manufacturing for Dixon Sinterloy, Inc. Remember, reserve now for the reunion June 13-15.—**E. David Howes, Jr.**, Secretary, Box 66, Carlisle, Mass. 01741

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We received a note this month from **Walter Shifran** who has taken a new position as Resident Manager of the St. Louis branch of Consoer, Townsend and Associates, Consulting Engineers. He and Jennifer now have two children. Lisa and Jeffrey. Walt has been a Director of the M.I.T. Club of St. Louis for the past several years.

All you need . . .

Although he is a Chemical Engineering graduate, **Zaven A. Dadekian** is putting the Course XV crowd to shame. A book entitled, *The Strategy of Puts and Calls*, authored by him, has recently been published by Corinthian. From the favorable review that was published in the Detroit News, it seems Zaven had developed a simplified method of dealing in these

situations so that all you need in addition to the book to prosper is "a degree of market sophistication and experience well above that possessed by the average investor;" a thorough knowledge of complicated margin rules, tax laws and nerves of steel, giving you "the ability to make and stick with instant decisions involving substantial sums of money." In addition to his efforts in the literary field, Zaven is head of the Research & Development Department and is a Director of an East Coast chemical manufacturer.

Robert Temple writes that as of November 1968, he departed from American Cryogenics, Inc., to join L.N.G. Services as Vice President. This relatively new organization, based in Pittsburgh, has combined resources in the fields of Cryogenics, Energy and the Marine Space fields to help develop the liquified natural gas industry around the world. L.N.G. Services acts as management consultants and as engineers and operators for the liquified natural gas business. Bob says that Katrina and he have the welcome mat out for anyone who comes through the Atlanta, Ga., area.

Ashton Stocker is now Vice President-Operations, of Instrumentation Laboratory, Lexington, Mass. This company is a major factor in the bio-medical instrumentation field, having sustained a remarkable growth within the past few years. . . . *Duwayne Peterson* is now Systems Manager for a Product Development Group at Ford Motor Company in Dearborn. He and Nancy have three children, two boys and a girl. . . . *Robert Davis* started Davis Computer Systems, Inc., in New York City last June. The company specializes in applications of fast response computer technology to process control and time sharing. As of January, the company had about 20 people and is growing. . . . In March, *Arthur Solomon* participated as a panel speaker at an I.E.E.E. meeting in Lexington, Mass. Art is a Section Head in charge of solid-state microwave components at Sylvania in Woburn. His presentation discussed how integrated microwave circuits can be applied to proposed systems to improve performance and reliability, and to reduce cost. . . . *John Brown* recently formed Betatech in Bedford, Mass. The company is involved in the design and production of peripheral and interface hardware for computer applications. Jack, Anne and their two children, Ginny and John, live in Lincoln.—Secretaries: *Mrs. J. H. Venarde* (Dell Lanier), 16 South Trail, Wilmington, Del. 19803; *L. Dennis Shapiro*, Aerospace Research, Inc., 130 Lincoln St., Boston, Mass. 02135

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Well, now that Apollo 9 and Red Rover are back on the ground, we can all stop holding our breath—Great job, Russ! . . . *Donald Bavy* has left Computer Usage, his employer since leaving Tech, and expects to remain in Dallas. *John Broyles*

is teaching mathematics at the London School of Business Studies and is completing his doctoral thesis "A Stochastic Model of New York Stock Exchange Transactions." A third child, Charlotte, was born December 1967. . . . Assistant Professor *Bob Carlson* of the Harvard Business School is working on a research project titled "Investment Companies and Their Shareholders." . . . *Don Ferguson* writes that he has become very active in Y.M.C.A. activities and has recently been elected to the Board of Managers of the Buffalo "Y."

Eugene Friedrich is an Associate of Tip-petts-Abbott-McCarthy-Stratton, consulting engineers and architects. Gene is conducting port feasibility studies for Costa Rica and bridge development in Colombia. . . . Assistant Professor *Jerome Gillson* of Johns Hopkins teaches political science and is currently writing a book comparing British and Soviet politics.

Larry Moss is spending a year in Washington as a White House Fellow assigned to the Secretary of Transportation. . . . The Public Service Company of New Hampshire has named *Chuck Stetson* as Manager, Research Department. Chuck has been with P.S.N.H. since leaving Tech except for his tour in the Army.

Rosemarie Wahl Synek writes that she received her masters in biology from the University of Chicago in 1961, was an Instructor in the Department of Biology at the University of Illinois at Chicago Circle in 1965-1966, received her Ph.D. in microbiology at the University of Chicago in 1967 and currently is an assistant professor on the graduate faculty at Texas Christian. In her spare time during 1965, she wed Dr. M. Synek, a theoretical atomic physicist who is now a professor of physics at Texas Christian University. Somehow Rosemary found time to give birth to a daughter, Mary Rose, in 1966.

Commander *Roderick White* is Chief of the Applied Engineering Section at the Coast Guard Academy. As a consultant in ice breaking, he had done the conceptual hull design of the Manhattan, an oil tanker being modified to bring oil from Alaska's North Slope across the Arctic Ocean to the East Coast.

Ernest Wolff has left his job as Senior Consulting Scientist at Avco to join UNESCO. Currently he is establishing materials science and technology courses at the University of Lagos, Nigeria. I must also bring to your attention that *Guy Spencer* is leaving the Alumni Office to manage family interests in the Boston area. Please note the mailing address changes.—Co-Secretaries: *Bruce B. Bredehoff*, 16 Millbrook Road, Westwood, Mass. 02090; *T. Guy Spencer, Jr.*, 73 Church St., Weston, Mass. 02193

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News is pretty slim over here. Perhaps the dock strike in the United States is the cause. (This is March and we just re-

ceived a card conveying seasons greetings from *Alan May*.) So lets get going or there won't be much to report. A few months ago I wrote on the activities of *Fred Jaggi*. Adjoining this column, you will see a photograph I took of Fred and his wife, Valerie, on the occasion of the recent M.I.T. Club of Great Britain dinner. In the background, you will be able to pick out Dean Pounds who was the speaker at the dinner. . . . *Bill Griffin* writes that he has moved to California and is working for the Northrop Corporate Laboratory. His specialty is fluidics. He is also supervising research in heat pipes.

Jay Holladay has been living and working in California for five years with the Jet Propulsion Laboratory at Pasadena. He is currently working on the Mariner 1971 Mars Orbiter Project. . . . *Tony Ham-bouris* keeps us up to date with the following news. "I am presently General Manager at one of Worthington's Overseas subsidiaries, Worthington Colombiana S.A., in Bogotá, Colombia—after a 4-year stretch in the Far East and prior to that two years in Puerto Rico. For anyone who wants to write direct: Apartado Aereo 6820, Bogotá, Colombia."

Harold Shane advises us that he is currently Assistant Professor of Mathematics at the Baruch College of CUNY. He received his Ph.D. in mathematics from New York University in October 1968 after six years at night school, during which time he taught math at the Cooper Union. Harold is married to the former Mita Geltman. They have two little girls.

Solomon Buchsbaum (see photo) has been elected Vice President in charge of research of the Sandia Corporation in Albuquerque, New Mexico. The Sandia Corporation is a subsidiary of the Western Electric Company. Solomon joined Bell Laboratories, the research and development unit of the Bell System, in 1958. During his early career he engaged in experimental and theoretical research in gaseous and solid state plasmas. He became head of the Solid State and Plasma Physics Research Department in 1961 and was appointed to his present post in 1965.

Ed Walter was appointed Head of the Bureau of Engineering in the Department of Public Works for Baltimore City in March of last year. . . . *Bob Tuffias* writes that he is married and has two children, both girls. He received his Ph. D. from Stanford in 1966 in the Department of Aeronautics and Astronautics. He is now employed by Autonetics in Anaheim as a Staff Engineer in the Gyro Development Group.

Bernard Levy, until mid-1968, was Associate Physician in charge of the Psychiatric Consultation Service at the John Hopkins Hospital and also child-psychiatrist at Hopkins. His work there included using lithium to treat mania-depressive illness. In July of last year Bernard moved to Boston to continue this same work at the Massachusetts General Hospital and Harvard University.



Valerie and Fred Jaggi, '57



S. Buchsbaum, '57



J. Lazarchik, '58



S. B. Parkoff



A. J. Collias, '59

Jeffrey Wisnia's note read as follows: "In March 1968 I ended a nine year career in Aerospace Instrumentation with Comstock & Wescott and became Chief Engineer of Pioneer Instruments, Hanover, Mass. Pioneer is the equipment manufacturing division of Alpine Geophysical Associates, a major oceanographic firm."

In a recent issue of *IEEE Transactions on Magnetics*, a biographical sketch of Jack Judy appeared in conjunction with a technical article. The sketch read in part as follows: "Jack Judy received the B.S. and M.S. degrees in electrical engineering from the Massachusetts Institute of Technology in 1967 and 1959, respectively, and the Ph.D. degree in electrical engineering from the University of Minnesota, Minneapolis, in 1965. From 1957 to 1960 he taught at M.I.T. and worked with the Magnetics Group of the M.I.T. Laboratory for Insulation Research. From 1961 to 1963 he taught at the University of Minnesota. In 1965 he joined the IBM Systems Development Laboratory, Poughkeepsie, N.Y., and was transferred to the Systems Development Division, Boulder, Colo., where he is working on a magneto-optical films and magnetic recording. Dr. Judy is a member of Eta Kappa Nu, Tau Beta Pi, Sigma Xi, the Scientific Research Society of America, and the IEEE Magnetics Group." . . . My Secretary advises me that if I want to get this in the mail tonight I better stop here. I have a few things left for next month but I am running light on news so please help me out. Also keep in mind that I look forward to seeing any of you who get through London in the months ahead. My home telephone number is 235-2720. During the day I can be reached at my office; There the telephone is 839-1262. —F. L. Morefield, Secretary, 18 Waddon House, William Mews, London, S.W.1

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David Berg has been appointed as sales manager for New Hampshire Ball Bearings, Inc., a firm which he joined in 1961. His prior positions with the company were as assistant sales manager and central regional manager. He lives in Peterboro, N.H., with his wife and family.

Ottello Breda is the new sales manager for Esso Standard in Malaya. He has held several positions in the Far East for Esso since 1958. . . . Jim Mahaffy has been appointed manager of Chase Metals Service's new national processing center in Chicago. Jim, a member of the reunion committee, displayed magnificent timing by moving out to Glen Ellyn, Ill., just before the reunion.

Hillel Auerbach had told us that he had "other plans" for reunion weekend and we now know what they were—Their son Stephen David was born on June 11. (We forgive you this time but expect to see you at the 15th). . . . Paul Larson has been transferred by DuPont to one of their manufacturing divisions in Clinton, Iowa, where he is a development supervisor. Paul and his wife now have a second child, a boy Paul Scott, born in 1967. . . . Ernest Gardow has joined the faculty of the School of Engineering at the University of Hartford. He was previously a research assistant at M.I.T.'s Gas Turbine Laboratory and was a senior analytical engineer at Hamilton Standard Division of United Aircraft. . . . Greg Lazarchik has been named development coordinator in P.P.G. Industries corporate development department. Greg has been with P.P.G. since graduation and has assumed various posts, including that of project coordinator in the chemical division's marketing research department. He and his wife, Ann, are living in suburban Bethel Park with their three children—Gregory, 7, Laura, 6; and Steven, 5.

Readers of *Machine Design* magazine have probably noticed by now that Stan Klein is now the regional editor and is based in New York City. In his letter Stan writes "should any classmates be visiting New York City and happen to have a free luncheon period, I would enjoy chatting with them about old times and current interests." (It looks like Stan is buying—everybody call him!)

Eighty-five paintings by Yanni Posnakoff were placed on exhibition aboard the T.S.S. *Queen Anna Maria* of the Greek line last summer. He returned to Greece after 15 years here in the United States in order to rediscover the traditions of the land in which he was born.

Eugene Elander sent a brief note telling us that he has "assumed new duties as associate professor and chairman of the department of business at Atlantic Community College, Mays Landing, N.J. My wife Ruth and I and two children live on the bay in Brigantine, N.J., and enjoy swimming, boating and beach-combing." . . . David Cotton is with Digital Equipment Corporation where he is marketing manager for the PDP-10.

Jack Christensen is the new director of M.I.T.'s Industrial Liaison Office. The Christensens have three children and are living in Lexington, Mass. Jack has served as assistant director of the office for the past two years and has been on the staff since 1963.

Roden Brandt has been designated as system director of schedule development at Eastern Airlines. In this post he will be responsible for developing current schedules as well as schedule model development for advance and future schedules. . . . Robert Doyle has been named assistant manager of operations in engineering at Humble Oil and Refining Company. Previously he was the manager of operating program coordination in the supply department. . . . John Arthur Miller has been appointed director of design for Harley, Ellington, Cowin & Stirtan, Inc. . . . An award for excellence in teaching was made last year to David McDougall, instructor in the department of mechanics and hydraulics at the University of Iowa. The prizes were given by the Standard Oil Foundation and the selection was made by student representatives of honor societies and endorsed by the University Counsel on Teaching. . . . We were sorry to learn of the passing of Kenneth S. Welsh who will be missed by his many friends in the class.—Michael E. Brose, Secretary, 1171 North St., Walpole, Mass. 02081; Antonia D. Schuman, 22400 Napa St., Canoga Park, Calif.

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Reunion, reunion, reunion. . . . Yes, now that you mention it, there does seem to be one coming up . . . only a month away! Omigosh, better make reservations, pack suitcase, find roadmaps, go, go,

go! Where's that again? . . . O yeah, Wentworth-by-the-Sea in Portsmouth, N.H., Friday the Thirteenth? . . . You've got to be kidding! . . . You're not?

Nope, we're not kidding, and it's going to be one of the best reunions ever. Where else can you get such varied and sundry items as a *Gerry Stephenson* Presidential Report, an AI Bufferd Questionnaire Response (computer compiled, no less), a breath-taking Class Election, golf, swimming, a banquet, Monte Carlo Night, etc., etc., etc. And if you happen to be friendly, you may even enjoy meeting those classmates that you haven't seen for five or ten years. There are a lot of them coming and they are all looking forward to seeing you! Don't just sit there! Get that reply card back to the hotel so that you can join the rest of us. Who says that 30 years old is the end of the line! Now, after that crushing finale (but not before filling out the reservation card), let's settle back into the easy chair, light our pipe, refill the martini glass, and relax with the '59 gossip column . . . this month brimming with news of promotions and appointments.

Cummins Engine Co., has announced the appointment of *Frank Manak* to the position of patent attorney for the corporation. Frank was formerly a patent attorney for U.S. Steel, and holds an LL.B. degree from Western Reserve. He, his wife, and their two children now reside in Columbus, Ind. . . . *William Guyker* has been promoted to senior engineer in West Penn Power's production department in Greensburg, Pa. Bill previously had worked on assignments in California with the East Central Nuclear Group, an atomic energy R&D group in which West Penn and 13 other investor-owned utilities hold membership. He presently serves as a director of the Pittsburgh section of the I.E.E.E. . . . *Gerald Katz* is now assistant to the chairman of the board and manager of corporate acquisitions of Witco Chemical Corp. . . . *Richard Allen* has been appointed Manager of Display Products at I.R.A. Systems, Inc., where he will direct the design and development of the company's computer-driven cathode-ray tube display line. Dick, his wife Jane and their five children live in Westboro, Mass.

The list of recent appointments grows still longer with the announcement of *Edward Ahlstrand* as controller of the I.B.M. Development Laboratory. Holder of an M.B.A. from the University of Chicago, Ed is responsible for financial control of laboratory resources. He, Mandy, and their three children live in Boulder, Colo.

Foster Wheeler Corp. has appointed *Andrew DeStena* as Chief Project Engineer of their Houston, Texas office. In that capacity, Andy will be responsible for the administration of all project engineers assigned to contracts and proposals and for their technical performance. . . . *David Weisberg* is the new Director of Marketing for Keydata Associates of Keydata Corp., in Watertown, Mass. . . . Technical Forum Associates,

Inc., a recently formed corporation engaged in arranging and presenting practical technical conferences on the latest advances in science and technology, has announced the appointment of *Arthur Collias* as President. Aside from pressing responsibilities as a member of your Tenth Reunion Committee, Art will coordinate two-day seminars on material joining techniques, wear and lubrication, and other subjects of interest to the industrial community. He previously served as an Industrial Liaison Officer at M.I.T., and before that was involved with contract administration at Avco RAD.

Stephen Parkoff is now Vice President and General Manager of the Washington Division of M. Loeb Corporation. Steve, who has an M.B.A. and a Ph.D. from Columbia, had been a Senior Consultant on the staff of Operations Research, Inc., where he was responsible for a variety of projects concerned with management systems in industry and government. Steve, Barbara and their two children, Seth and Susan, reside in Silver Springs, Md.

Alumni spend and save

Other classmates in the news this month are *Peter Kuempel* and *Allen Chertoff*. Pete, in his second year of research at the University of Colorado Institute of Developmental Biology, has received a grant for research on the initiation of chromosome replication, using an intestinal bacterium to discover of the arrangement of genes in a chromosome is important in controlling the growth and division of the cell. He holds a doctorate from Princeton, and has done postdoctoral research at the University of Copenhagen on an N.S.F. fellowship. While Pete and many others of us are getting government money, Allen is saving it: he is the recipient of the 1968 Air Force National Cost Reduction Award, presented to him for saving the Air Force \$400,000 in contract costs.

Congratulations to all of you, and may you use your new-found fame and fortune to promote your trip to the fabulous Tenth Reunion (I never pass up the chance for a commercial).—*Glenn Zeiders*, Secretary, Avco-Everett Research Laboratory, 2385 Revere Beach Parkway, Everett, Mass. 02149

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Jerold Rekosh has moved to San Francisco where he is a staff psychologist with the Community Mental Health Services at San Francisco General Hospital; he reports a second child due in February. And more news from the West Coast—*Stephen Pollack* has been promoted to Associate Professor of Operations Analysis at the Naval Postgraduate School in Monterey. He says he is living on the ocean in Pacific Grove and extends an invitation to drop by when in the area.

Francois Audibert is at the Institut Francais du Petrole in Rueil-Malmaison

(France, of course) working on hydrofining and refining of petroleum distillates and hydrodesulphurization, especially in the field of residues. Don't ask me for an interpretation of all that; I simply report what everyone is doing, whether it makes any sense at all or not.

John Norris is now Vice President, Marketing, for Lennox Industries, Inc., in Marshalltown, Iowa. *Joseph Goldstein* is an Assistant Professor of Metallurgy and Materials Science at Lehigh University, Bethlehem, Pa.

Marshall Douglas Nelson (Captain in the U.S.A.F.) has been assigned to the Air Force Communication Service Headquarters at Scott AFB, Ill. He is working towards his D.B.A. degree part-time at Washington University. For those who don't know, the D.B.A. is "Doctor of Business Administration"—the one which I am working towards too.

Sally and *Dick Oeler* write that they are the proud parents of a second son, *Rolf Harold*, born on February 24: "Dick has been traveling to the Southwest but managed to be home for the event. He's in sales of a line of separable gas-engine compressors for Ingersoll-Rand. He also spends some time in Canada." Thanks for the note, Sally. By the way, information for class notes does not have to be personally penned by a member of the class: odd scraps of information from wives, sweethearts, secretaries, etc., will be gladly accepted.

Joe Verderber has been appointed to the M.I.T. Educational Council; Joe is living in Lyndhurst, Ohio. *Joseph Lambert* has been promoted to Lieutenant Colonel in the Air Force. He is chief of the Air Force Solar Forecast Center at Ent AFB, Colorado.

You'd be surprised at the things I get in the mail. For instance, I have a copy (from the M.I.T. clipping service) of a fascinating paper written by our class president. The title is "Bayesian Autoregressive Time Series Analysis" and the first person to write in asking for it can have it—free. *Gerry Hurst* wrote it, of course, and as the credit line on the paper points out, it is "adapted from a Ph.D. dissertation submitted to the Sloan School of Management." This gives me an opportunity to mention, if I haven't already (I don't read the column from month to month, just write it, so I forget) *Gerry Hurst* has left General Electric in Philadelphia and taken up a faculty appointment with the Wharton School. Here's a golden opportunity to get an article from the *I.E.E.E. Transactions on Systems Science and Cybernetics*. We might even be able to get *Gerry* to autograph it.

Just a few more notes and then I have to get back to work. *George Meyers* married Miss Akiko Endo, a World Airways stewardess from Oakland in Tokyo in January, 1968. George has been transferred to Scott AFB, Ill., and is working as the program manager for all U.S.A.F. pro-

grams for air/ground communications for air traffic control. *Boone Powell* was made a partner in the San Antonio architectural firm of Ford, Powell and Carson in 1968. He had been an Associate in the firm of O'Neill Ford and Associates since 1960. Send your biographies (or copies of your technical papers) to—*Linda G. Sprague*, 10 Acorn St., Cambridge, Mass. 02139

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Professor *Malvin Teich*, over at Columbia University (E.E.), received the Browder J. Thompson Prize from the I.E.E.E. in March. That prize is for the best paper in an I.E.E.E. publication by an author under 30. Mal just got in under the wire. The press release reports that he has a Ph.D. from Cornell (1965) and that the prize winning paper was titled "Infrared Heterodyne Detection." On the other side of the lecturn sits Richard Howe. He is in graduate school at the University of Wisconsin "working toward a Ph.D. in Urban and Regional Planning." Last year he completed an M.S. in water Resources Management at University of Wisconsin.

Charles Neht, Jr., is: a) still single, b) an M.S.E.E. from Lehigh (1967), c) working on a Ph.D. at Lehigh and d) gainfully employed as a supervisor of computer applications group of the Fuller Co., in Catasauqua (whereat?), Pa. Sandy Wagner teaches but cannot be enticed into the University rat race: "A wonderful trip to Europe (mainly Greece and England and inbetween) occupied the summer for my wife, Linda, and me. Yes high school teaching has its rewards! I am teaching at Mountain View High School, Mountain View, Calif." *John Castle* works days at Procter and Gamble and teaches nights at the University of Cincinnati. He is teaching a class called "Industrial Process Calculations." *Donald Ellis* is Assistant Professor of Physics and North Western. *Sue Kannenberg* also teaches physics. She does her work at Boston State College.

Life Behind the Glass Walls

The bulk of my recent mail has come from people actually working for a living outside of the university. For example: *Myles Friedman* is Chief Engineer at Southwest Engineering Consultants in Fort Smith, Ark. *Dave Sachs*, says, "I am doing underwater acoustics research at the Cambridge Acoustical Associates in Cambridge, Mass. I was recently engaged to Maurie Markowitz (B.U.'69). The wedding is planned for June 1969." *Romney Biddulph* is in Sao Paulo, Brazil working for Willys-Overland do Brazil. He says that it is only 50 to 100 miles to some very scenic beaches. *Ed Tucker* still works for Hercules Chemical only the location has changed. After 18 months in Wilmington, Del., he packed up and moved to Lake Charles, La. *John Reed* is a full Vice President of the First National City Bank of N.Y. That makes him the youngest VP at the Bank. Over at IRA systems in Waltham, Mass., *Ed Sonn* is the Manager of Computer Applications

and is in charge of hardware and software development. *Leonard Spar* is Executive Vice President with the Boston Computer Group, Inc., in Boston. I guess you move up fast in computers. *Frank Russo* is the manager of the Stanley Tool Co. plant in Plantsville. He started at Stanley in 1963 and has been moving up ever since.

And then you can work for the Government

U.S.A.F. 1st Lieutenant *Charles Rogers* is at the Air University's Squadron Officer School at Maxwell AFB in Alabama. *William Anderson*, operating from Udorn AFB in Thailand, completed 100 missions over Vietnam and has been assigned to an undisclosed local. *Harold Heggstad* got his D.Sc. in E.E. from M.I.T. and now works for Lincoln Labs on the ABM. This winter he began 18 months of work at Kwajalein Atoll in the Marshall Islands somewhere between Hawaii and Australia. Also going along to this lovely spot are wife Barbara, Martin (5), David (3) and Lauren (1.5). *Parvin Lippincott* works for the A.E.C. at the Hanford Labs in the State of Washington. He has two boys, George and John. *Nancy Burow Werner* works for the National Center for Atmospheric Research in Boulder, Colorado as a staff programmer. The Werners live in Denver and Nancy keeps busy caring for two kids. *Pete Gray* works for state governments. He is the director of the New England Regional Criminal Intelligence Information System Project. You ask: How does a Ph. and D. in E.E. help out with Law'n Order? You got me. Perhaps a letter from Pete will be forthcoming. *Dave Latham* is working with a 60 inch telescope at Mt. Hopkins for the Smithsonian Astrophysical Observatory. He will be doing visible and infrared spectroscopy.

The Arts

If it weren't for *Gus Solomons* I would never have anything to write in this category. Gus put on a remarkable show last December. It was a dance program that involved two TV stations and a stereo FM station. The viewer put two TV sets side by side tuned to the two stations and the action would move from set to set. The sound came from the stereo speakers. The pictures were in color so to get the whole effect you had to spend a bundle. The name of the show was "City/Motion/Space/Game" and the reviews were mixed. But it caused quite a stir.

My excuse for lack of coherence in this month's column is the set of new lungs that have entered the Braun family. They belong to Stephanie Braun, age 0.02 years.—*Andrew Braun*, 131 Freeman St., Brookline, Mass. 02146

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Though I have heard nothing new from our Reunion Committee as of this writing (mid-March), our first Reunion is definitely scheduled for next month. Mailings will be sent out to give complete details.

In the meantime. . . *Charles Abzug* is engaged to Miss Zipora Ernst of Israel, who is a graduate student in microbiology there. . . *Edward Arnn* is now a captain in the Air Force, and is stationed in California. His wife JoAnn teaches biology out there. Ed recently obtained his Advanced Radio Amateur License on the first try. . . *Thomas Baker* is living on six acres of land west of Loveland, and is working as a design engineer at Hewlett-Packard. . . *James Bradley* is working toward his Ph.D. at the University of Rochester. . . *R. B. Colvin* is an intern in surgery at Massachusetts General Hospital. . . *James Dorr* is working on his dissertation in humanities, and reports that he is no longer dating a belly dancer.

Charles Elias was married in December to Miss Emilie Harris of Los Angeles and is presently working at the Hughes Aircraft Co., in Los Angeles. . . *Richard Fisher* has moved to Montreal where he abhors the cold weather. . . *David Freedman* is working as a systems engineer for I.B.M. in the Boston area. . . *Jeff Friedberg* is living in Philadelphia and working for Aero Service Corp., a division of Litton Ind. . . *Sanford Hellman* is in Lynchburg, Va., doing nuclear fuel management work with Babcock & Wilcox Co. He is also a flying buff, and received his private pilot's license last September. . . *Heinz Killias* left his position as scientific representative in Europe for G.E. last July and is now a division manager at the corporate research center of Brown Boveri Co. in Baden, Switzerland. . . *Wayne Matson* is a lecturer in environmental chemistry at the School of Public Health, University of Michigan.

John Moter is working for Raytheon in Bedford, Mass., on LSI computer development. He has received rankings in both singles and doubles tennis in New England. . . *George Piotrowski* expects to receive his Ph.D. at Case-Western Reserve this year. He then plans to engage in research and college teaching in fields involving both engineering and medicine. . . *John Rainier* is at Lincoln Labs as a systems programmer. He is the proud father of Kevin Michael, born last September. . . Mrs. Enid B. Schoettle received her Ph.D. in political science in 1967, and is now an assistant professor at the University of Minnesota. . . *Allen Strand* is a securities analyst with J. Barth & Co., in San Francisco.

Mike Stulberg will finish Harvard Medical School in June, and hopes to intern in California. . . *Leon Sutton* has spent a year in Paris and several years in the physics department at Princeton. He is now heading for Stanford with his wife to take a postdoctoral position there. . . *Warren Wiscombe* expects to receive his Ph.D. in applied math this year, and will then be looking for a position in industry or government. That's the news; let me hear from you.—*Ron Gilman*, Secretary, 1021 Oakmont Pl., Apt. 8, Memphis, Tenn. 38107

Matt Mleziva reports that he ushered at the recent weddings of *Sid Everett* and *Joel Greenwald*. Joel married the former Miss Claire Scharff. The Mlezivas are now living in New Castle, Ohio, near Wright Patterson AFB. . . . **Jeff Karas** published the errata in a recent issue of the *IEEE Transactions on Antennas and Propagation*. . . . **Dave Disher** is the director of research at Geophysics and Computer Services, Inc. Dave, his wife Mary and their two children are now living in New Orleans. **Kim Kimerling** and his wife, Linda, had their first child, Rachel, in February. Kim received his Ph.D. from M.I.T. in metallurgy.

Steve Deutsch completed his Ph.D. work in physics at Tech and joined the staff of the Institute for Defense Analyses. . . . **Bob Morgan** is a 2nd Lieutenant in the U.S.A.F. serving at McConnell AFB, Wichita, Kansas. Among his responsibilities is the publication of the base newspaper. . . . **Steve Dargel**, **Howie Schiffman**, and **Dick Sidell** are sharing an apartment in Westwood, Mass. Steve and Dick are finishing up Ph.D.'s in mechanical engineering while Howie is in the middle of an air force tour of duty at Bedford.

Myron Weber is currently a research fellow at the University of Minnesota working on a doctorate in Industrial Relations and Psychology. . . . **Allen Zaklad** is at the University of Pennsylvania working towards a Ph.D. in psychology. . . . **John Christensen** recently co-authored an article on thermoconductivity effects which was published at an A.I.M.E. conference on high temperature nuclear fuels.

Mary Coffey received her masters from the department of Astro-Geophysics, University of Colorado last August. . . . **Bill Morgansen** received his M.S.E. degree from Princeton and is now at Rutgers working toward a Ph.D. in materials science on an N.S.F. traineeship. . . . **Ed Bucher** finished his Ph.D. work at the E.E. department of M.I.T. and is now working on communications research at Lincoln Lab. . . . **Allen Pogeler** is working in the marketing department of Atlantic Research Corporation selling solid-fuel rocket motors. . . . **Peter Klock** is finishing his Ph.D. thesis in Biophysics at Johns Hopkins.

Dave Crawford completed his tour of duty with the Navy serving on the U.S.S. *Guam* which picked up Gemini II. Dave is now working on an M.B.A. at Northwestern. . . . **Leo Lake** has finished his masters and has started on his Ph.D. at the University of Minnesota. . . . **Geoffrey Gill** is now the manager of the Advanced Materials Group of G.E.'s Aerospace Instrument Section. . . . **George Kinal** finished up a two-year tour of duty with the U.S. Army Satellite Communications Agency at Fort Monmouth. . . . **Joel Westerman** was at the Pentagon for two years as a computer systems analyst and is now living in Warwick, R.I., and work-

ing for Artistic Laces, Inc. . . . **Ka Yip** is working on a Ph.D. in radio astronomy at Cal Tech. . . . **Ed Kampmann** is at Berkeley continuing his Ph.D. work in city and regional planning. . . . **Bill Grosky** and his wife report the birth of a daughter, Sara Beth, in July. Bill is at Yale working toward a Ph.D. in computer science.

Hank Lichstein writes that he and his recent bride are now living in Alexandria, Va. Hank is working for the comptroller's office in the Defense Department. . . . A long write-up on **Bill Brody** appeared in the *Stanford Observer* last February. Bill is working and studying for two doctorates, one in E.E. and the other in medicine. He received the Hewlett-Packard Biomedical Engineering fellowship at Stanford.—**Jim Wolf**, Secretary, 24455 Lake Shore Blvd., Apt. 1114, Euclid, Ohio 44123

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Since our Uncle Sam appears to be the man in charge I thought we would begin with notes from those in the service. Captain **Richard Storat** completed a year with the 18th Engineer Brigade in Vietnam last September. He is now with the U.S. Army Engineer Reactors Group at Fort Belvoir where he is working on the replacement of the steam generator at the Army Nuclear Reactor at Fort Greely, Alaska. . . . **Homer Holland**, a captain in the U.S. Army, is stationed in the Pentagon as an Operations Research Analyst in the Office of the Chief of Staff of the Army. . . . U.S.A.F. Second Lieutenant **Greg Wight** is serving as a contract management officer at General Electric in Cincinnati. Greg received his M.S.E. in Mechanical Engineering from the University of Florida last August.

Paul Tarantino, having been commissioned last June as an ensign in the U.S.N.R. is in Pensacola, Fla., for air navigation training. . . . **McDonald Robinson** completed two years of active duty last October as a Captain in the U.S. Army. He then took a two-month cruise of the Caribbean on a forty-foot schooner with his wife Nancy and child. . . . **Mark Magnussen**, now a Major in the Corps of Engineers, is still assigned as a research associate at Lawrence Radiation Laboratory.

And the Peace Corps

I just received word from three more classmates who are in the Peace Corps. **Paul Martin** is working on the organization and education of cooperatives in the Antiplano region of Bolivia. He writes that the work is interesting and the environment more so. . . . **Charles MacFarland** trained in Hilo, Hawaii, and is now a teacher in Malaysia. He will be there two years. . . . **Travis Gamble** has arrived in the "security sensitive" area of northeast Thailand for two years of work on the National Potable Water Project. The objective of the project is to bring high quality potable water to small rural villages, thereby reducing the rates of

water-borne infectious diseases such as typhoid, cholera, and dysentery. For three months Travis trained in Hawaii where he studied Central Thai and had a good time. Although he studied Central Thai, he will have to speak Lao in the Northeast, but this doesn't seem to bother him, as he writes that he cannot speak either language. He also writes: "I would tell you what all the Lambda Chi Alpha's are doing, but it sickens me—they all are either married or about to be except **Jack Mumford** who is still at Tech working on his M.S. Most are in the Boston or Washington areas."

In the Working World

Jim Rumbaugh, having graduated from Cal Tech, is working at General Electric Research & Development Center as a systems programmer. . . . **Ron Scharlack** is developing an anti-skid device for Kelsey-Hayes Company in Detroit, and he plans to return to San Francisco from time to time to work on other ideas. Ron is happy to report that he flunked his physical and therefore won't have to think about going to jail or leaving the country. Flunking exams can be fun. . . . **Bill Weber** is with the Systems Analysis Section of Philco-Ford Corporation, Newport Beach, Calif. He is working on the Chaparral Missile System. . . . **Ken Follansbee** received his M.S. in Civil Engineering from M.I.T. and is employed by the MITRE Corporation in Bedford as a member of the Technical Staff in the Information Processing Systems Department.

Nathan Teichholtz and his wife Rickey are both working at Digital Equipment Corporation in Maynard, Mass. They had previously worked together at UNIVAC in Philadelphia. . . . **Alan Hirsch** is still at Argonne National Laboratory in the Applied Math Division. Last September he took a trip with Kenneth Drity, '66, to Grand Canyon, Bryce Canyon, Carlsbad Caverns, and Zion Canyon. They also travelled by boat on the Green River through Lodore Canyon in Colorado and Utah. . . . **Rasiklal Shah** joined General Electric in March of 1968 as a Fluids Control Engineer. In January he assumed the duties of Systems Engineer in the Thermal Branch of G.E.'s Research & Development Center in Schenectady.

John Rible writes that, after his grant expired at Pacific State Hospital (for the retarded), he went to work for Honeywell as a Systems Representative out of the Los Angeles office. He still returns to the hospital on weekends for volunteer work with the retarded kids. He writes: "They're lovable." In September John travelled 10,000 miles around the U.S., camping in his V. W. "Magic Bus". . . . **Richard Graber** is with TRW Systems in Redondo Beach, Calif., and working for his M.S. in Electrical Engineering at U.C.L.A. . . . **Bob Ruhl** is Section Manager of Casting Laboratory at Chase Brass & Copper Company in Cleveland.

Chet Sandberg is with Westinghouse Research in Pittsburgh. He would like to hear from anyone in town. . . . **Ed**

Jakush is engaged in Technical Service & Sales Development in Industrial Chemicals with Rohm & Haas. . . . *John Ebert* is working at McDonnell Douglas in St. Louis after having received his M.S. in Electrical Engineering from Stanford. . . . *George Reichenbacher* is at Brookhaven National Laboratory where he is working on an improvement program for the alternating gradient synchrotron.

A few teachers

George Solomon is an instructor in the Electrical Engineering Department at Carnegie Mellon University. . . . *Dan Santini* received his degree in Architecture after a five-year course. He is teaching high school physics at an experimental high school that is situated both in a high-middle income neighborhood and a county officially declared to be a poverty area. Therefore, he is drafted deferred. Dan is planning a summer trip to Scandinavia. . . . *Paul Chapin*, Assistant Professor of Linguistics at the University of California at San Diego, has been appointed Associate Editor at *MT* (Journal of the Association for Computational Linguistics). He and his wife have adopted their third child, David.

Still pursuing degrees

Harvey Deitel received his S.M. in Electrical Engineering from M.I.T. in September. He is now a research assistant with Project MAC while working for his Ph.D. in Electrical Engineering. . . . *Richard Murphy*, having received his M.S. in Mechanical Engineering from Stanford, has returned to M.I.T. and is preparing to take qualifying exams. Last summer he worked at U.S. Steel Research Center, Monroeville, Pa. . . . *Steve Powell* is in his second year at U.S.C. where he is working towards a Ph.D. in electrical engineering. He is specializing in system analysis techniques for the solution of urban problems. . . . Mrs. *Susan Grant* is a freshman at Boston University School of Medicine; last year she was a dilettante at Longy School of Music and M.I.T. Her husband Dick, '65, is writing a Ph.D. thesis in Math at M.I.T. . . . *Stan Rose* worked as System Programmer for MITRE last summer. He is still at M.I.T. studying electrical engineering.

Neil Steinmetz writes that he is studying medicine in Chicago and patching heads that have attacked clubs. . . . *Bill Christiansen* is in his last year at the Sloan School of Management. He is the teaching assistant for Professor Herbert F. Goodwin's Advanced Management Laboratory. . . . *Barbara Gilchrist* is in her second year at the Harvard Medical School. . . . *Bruce Ressler* is in his second year of study in Computer Science at Washington University in St. Louis. . . . *Mike Crane* is working towards a Ph.D. in Operations Research at Stanford. . . . *Tom Compton* received his S.B. last June and is now working on an S.M. in the Department of Metallurgy and Material Science at M.I.T. . . . *Bob Gann*, if not drafted, expects to receive his M.B.A. degree in June from the Graduate School of Business Administration at

Northwestern. Last summer he worked for General Mills in Minneapolis. *Leonard Fenocketti*, having received a National Institutes of Health Pre-Doctoral Fellowship, is at Yale working towards a Ph.D. in chemistry. . . . *Richard Stein* is a research assistant in physics at Polytechnic Institute of Brooklyn.

Salvatore Malgari is attending the Moore School of Electrical Engineering at the University of Pennsylvania under a U.S. Air Force one-year full-time graduate study program. His field of principal interest is Systems Engineering and Operations Research. . . . *Henry Heines* is a research assistant going for his Ph.D. in Chemical Engineering at University of Illinois in Urbana. . . . *Natalie Weiss* is in her second year of graduate school at University of Chicago, Department of Physics. . . . In September *Jeff Shapiro* received his S.M. in Electrical Engineering from M.I.T. He is now working for his Ph.D. on a National Science Foundation Fellowship. . . . *Martin Kohn* received his S.M. in electrical engineering from M.I.T. in September; he's now in the Class of 1972 at Harvard Medical School. . . . *Gary Epling* is in a Ph.D. program in organic chemistry at the University of Wisconsin.

Stanley W. Liu worked for a year at the Cambridge Electron Accelerator after graduation and is now a full-time graduate student in physics at the University of Pennsylvania. . . . *Barry Watkins* received his Master of Public Administration degree from the University of Michigan in December. . . . *Avram Markowitz* is an engineer in the Aero Physics Department of Raytheon in Bedford. . . . *Mark Hodes*, with whom I occasionally shot pool last year at Stanford, is in New York City with Mobile Oil's International Management Development Program. . . . *Pete Vale* is on a two-year stint in Japan with the U.S. Navy.

Many marriages

In August *Alan Dubin* married the former Miss Merdeith Ann Brown, a 1968 graduate of Boston University, and is currently employed by the United Aircraft Research Laboratories in East Hartford, Conn. . . . *Howard Greenbaum* married the former Miss Maureen Lampel of New York on March 23, 1968. . . . In June of 1968 *Alan Perelson* married the former Miss Janet A. Gerard, a Simmons graduate. He is continuing his graduate study in theoretical biophysics at Berkeley. . . . Last June *Bob Rice* married the former Karalaine Livingston, a 1967 Wellesley graduate whom he met by Contact computer dating. Bob is a second-year graduate student in Molecular Biology at Berkeley. . . . *Alexis Falquier* and his wife Dana, a 1968 Wellesley graduate, were married last June. They spent last July in South America keeping track of old friends and following the tracks of Incas, Mayas, and Aztecs; archeology is one of their hobbies. Alexis has joined McKinsey & Company (management consultants) as an associate and plans to transfer to Zurich, Switzerland. . . . The former Miss *Dianne Pickering* writes: "In

July I married James Maar (M.S. Brown)—not even an M.I.T. man! Presently I am going to school full time to get a M.S. in numerical science from John Hopkins University."

Last August *Brian Krupp* married the former Miss Brina Hollander, a graduate of Emory University, Atlanta, Ga. Brian, a research assistant, is working towards a Ph.D. in Astrophysics at University of Maryland. . . . *Lutz Henckels* married the former Miss Patricia Carrera in August and is now working for his Ph.D. in Electrical Engineering at M.I.T. He received his Master's last June. . . . *Ed Geltman* married the former Miss Nancy Milner last August. Ed is in his second year at N.Y.U. Medical School, and Nancy is presently working as a guidance counselor and instructor for an adult education program of the First National City Bank.

Dave Lapin married the former Sue Peiken in August; he is at the University of Wisconsin in computer science and working as a systems programmer for the computer center. . . . *Murray Katcher*, after graduation, worked first at Oxford University and then at Owens-Illinois Glass Company, Toledo, as a research chemist. He recently married the former Miss Suzan Schulak, a 1967 Brandeis graduate, and is now working on a Ph.D. in inorganic chemistry at University of Wisconsin.

And a few new arrivals

Larry McNichols and wife Margie are the proud parents of a girl, Molly Ann, born July 31, 1968. Larry is working for Northern Ordnance Division of F.M.C. Corporation. . . . *John Howard* writes that he is "up to two kids now, Kathy (November, 1966) and Julia, (June, 1968)." He is working for Graphic Sciences, a fairly new company that is attempting to cut into the field of facsimile transmission.

George Nybakken and wife, the former Miss Christine Witmore, have a son, Kristopher. George is working for his M.S. and possibly a Ph.D. in Engineering Mechanics at University of Michigan. . . . *Jim Kirtley* writes that he is "still at Tech trying to wring out a big degree. Our firstborn, Jennifer, came last January (1968). I still have some cigars for those who will come by Room 10-119." . . . *Gerald Holt* reports a second son, Robert born October 31, 1968. Gerald is working at Honeywell in Waltham.

Odds and ends

Ross Corotis has been elected district director of Delta Psi by the fraternity's New England chapters. Ross received his M.S. last year and is now studying at both M.I.T. and Harvard under a National Science Foundation fellowship. . . . *Charles Ward*, Ph.D., is doing elementary particle research in the High Energy Physics Division at the Argonne National Laboratory, Argonne, Illinois. . . . *Bob Landley* is working for General Electric and studying part time for an M.S. He recently became engaged, but no date has been set. . . . *Christopher Scott* is currently performing alternative service

at Mass General Hospital with a I-O classification; he is running a cyclotron in the research department. . . . *Sadaaki Kuroda* is head of a track maintenance section of the Japanese National Railways. He is responsible for controlling a thousand miles of lines and managing about two thousand workers. Safe and regular operation of trains is his main objective. . . . *Bob Rosenberger*, *Jeff Schoenwald*, and *Larry Galpin* spent two weeks last June driving through Mexico. Bob received his S.M. in Chemical Engineering from M.I.T. in June and is now working in Process Development for the International Division of Procter & Gamble in Cincinnati. Jeff is an instructor in Physics at University of Pennsylvania, and Larry works for duPont in Wilmington. . . . That completely wipes out all material in my possession, so keep the cards and letters coming.—*Jim Swanson*, Secretary, Services Provinciaux, Beni-Mallal, Morocco

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Gail has two tests in the next week so you will have to bear with the male viewpoint for two months in a row. I mentioned last month that M.I.T. was closed for a day due to snow. For those of you in California and elsewhere I would like to add that there was a snowstorm the next week which yielded the same results. This second storm was the largest on record for Boston.

Eloranta fellowships

I reported earlier the tragic death of *Peter Eloranta* on August 24, 1968. Although an excellent swimmer, he apparently struck a partially submerged object when he dove into the water. Several of his friends were around him but did not realize what had occurred because it happened so fast. I recently received a very nice letter from Peter's mother who informed me that Dr. Edwin Land, President of Polaroid Corporation, has given three summer research fellowships in his memory, which will be available to M.I.T. undergraduates each summer. At the time of his death Peter was employed at Polaroid as a scientist. These unique fellowships will be a very meaningful memorial to our classmate. (See: April Institute Review, p. 110.)

Former bachelors

Len Goodman writes that he was married to the former *Mindi Branch* in September. *Mindi* is a B.U. graduate and is now studying towards an M.A. in the classics at Tufts. *Len* is an engineer at the Instrumentation Labs, working on Project Apollo, and also is a special graduate student at M.I.T. . . . *John Cleary* married the *Nancy Miller* of Allston on June 1, 1958 and moved to New Haven in September. He is currently studying in the economics department at Yale Graduate School. . . . *William Donahue* has married the former *Cathy Welch*. He is now working on fuel cell research at the Naval Ship Research and Development Center and going part-time for an S.M. in chemical engineering at Catholic Univer-

sity. *Cathy*, who formerly went to Emerson, is now a student at the University of Maryland.

Paul Durda writes that we was wed to *Mary Elizabeth Brehn* who graduated from M.G.H. in 1967. He works for *Eli Lilly & Co.* in Indianapolis. Paul also reports that *Stanley Cygelman* and *Judith Brown* were recently married. . . . Last but not least, *Dennis Sager* married *Jeanne Kaswell* of Newton. He is with TRW Systems at the Manned Spacecraft Center in Houston working in the Real Time Auxillary Computing Facility in the Mission Control Center during Apollo flights as a trajectory analyst. *Jeanni* is taking classes in Houston and will graduate from Simmons in June. Her father is *E. R. Kaswell*, '39, who is his class' 30th reunion chairman.

Classmates in the news

Three classmates have recently been featured in the mass media. *Ken Morse* made the January issue of *Careers Today* complete with a color photograph (not a foldout). As we reported earlier *Ken* is president of the U.S. branch of A.I.E.S.E.C. He describes the organization as follows: "Now what A.I.E.S.E.C. does, and it's cool, is give firms an opportunity to contribute to business education and still spend money in their own firm. And you enable a U.S. student to go abroad and you bring a foreign student here and you've done something to transfer management skills . . . You're giving them a chance to come to the U.S. to see the way we are. To see that not everybody carries a gun and all these kinds of crazy things that people believe when they see only westerners." The article ends with the following philosophical quote from *Ken*, "Many people who go into business are looking for happiness and they don't know what happiness is all about. I sure don't. I'm trying to find happiness in business. And I think you need just as much a love affair with business as you need with women. I mean, I'm looking at it from my point of view. . . . International business is a gas." I wish *Ken* the best of luck as he continues with this very worthwhile exchange program.

Our own *Pete* and *Alexa Sorant* made the big time in *Tech Talk* as a result of service above and beyond the call of duty during the February 25 snow storm. Their neighbors, *Karl* and *Ursula Erhardt* were expecting their first child. *Ursula* was about to quit her job as an engineering assistant in metallurgy soon, but didn't get the chance. The time to go to the hospital came at 3:30 Tuesday morning in the middle of the storm. They were unable to navigate in their small sports car so they called *Pete*.

While the *Erhardts* and *Pete* snowplowed their way through Arlington, *Alexa* did telephone duty and explained the problem to the M.D.C. police. *Ursula* was transferred to a police car at Alewife-brook Parkway and both cars sped onward as best they could to the Boston Lying-In Hospital, where *Ursula* was ushered promptly into the delivery room.

Heidi, who made her appearance about five weeks early, weighed in at 5 pounds, 4 ounces shortly thereafter.

In uniform

Private Dennis Noson completed Basic Combat Training at Ft. Lewis, Washington on January 31. He reports that when lots fell he was assigned as a clerk in headquarters at the same base. "It is much better than infantry." . . . Lieutenant *Edward Williams* writes that after completing his S.M. thesis in course 16 he entered the Air Force because of the imminence of the draft. He is now stationed in Los Angeles working for the U.S.A.F. Space and Missiles Systems Organization. . . . Lieutenant *Steven Toth* recently received his commission from Air Force OTS at Lackland AFB, Texas and is also stationed in Los Angeles. He is assigned to the Contract Management Division of the Air Force Systems Command. . . . Finally, *Ken Theriault*, who has been working at the Instrumentation Labs, plans to enter the April 19 Navy OCS class at Newport, R.I.

From all around

Al Currano writes from sunny California that he is studying for a master's at Berkeley. His major, besides draft-dodging, is E.E. However, he has a I-A which he is trying to appeal. He reports meeting *John Barravecchio* and *Jeff Reece* out there. *John* is studying molecular biology while *Jeff* remains in chemical engineering. . . . *Steve Reimers* is still at M.I.T. and will be able to play Lacrosse again because 5 year students are still eligible. His thesis could be described as the "Boston Elbow," part of the well known artificial arm project which is integrated into the nervous system. . . . *John Sole's* work recently made the headlines. He has been a project engineer with *Brown & Root* on the construction of three offshore drilling platforms in the Santa Barbara Channel. He plans to enter the Construction Management Program at Stanford graduate school.

That's all the news we have for this month. If you haven't done so please drop us a line about what you're doing. We'd like to thank all those who have written so far.—*Gail* and *Mike Marcus*, Eastgate Apt. 4H, 60 Wadsworth St., Cambridge, Mass. 02139

Course Review

Copy for this issue of *Technology Review* was due from your Secretary about March 15. Information reaching him after that date will be reported in the June issue unless he desires to insert it in the Late News column.

V

John F. Brown, Jr., B.S., Brown University, 1947, accepted a position with the General Electric Company in Schenectady, N.Y., on completion of his requirements for the doctorate in organic chemistry, awarded in September 1950. Since September 1968 he has been a postdoctoral fellow at the State University of New York in Syracuse, studying the ways in which a physical scientist or engineer can interact constructively with the medical profession. Dr. Brown is the author of over 20 scientific papers in his fields of interest in research, particularly in radiation chemistry, polyfunctional catalysis, olefin nitration, infrared spectroscopy and polymer structure. He will return to his position as Manager of the Life Sciences Branch of the G.E. Research & Development Center. Dr. Brown's doctoral program was directed by Professor C. Gardner Swain.

Peter Kovacic joined the staff of the Department of Chemistry in 1946 after the award of the doctorate in organic chemistry (Univ. of Illinois). He held the post of Research Associate, full time, and was associated with the late Dr. Arthur C. Cope. After further postdoctoral experience at Columbia University and as a research chemist in industry, he joined C.I.T. in 1955. Dr. Kovacic is now a Professor of Chemistry at the University of Wisconsin, Milwaukee.

Emil Slowinski, Jr., B.S. Massachusetts State College, 1946, Ph.D. in physical chemistry, September 1949, Chairman of the Department of Chemistry at Macalester College, St. Paul, Minn. is on a year's leave at the University of Warsaw, Poland, to work in the Department of Theoretical Chemistry. While at M.I.T. he was the recipient (1948-1949) of the Charles Coffin Fellowship sponsored by the General Electric Company. Dr. Slowinski taught at Swarthmore after the award of his doctorate and later at the University of Connecticut.

Lloyd Taylor, B.S., Boston College 1954; Ph.D. in organic chemistry, February

1958, accepted a research position with the Polaroid Corporation, Cambridge, on completion of his requirements. He was granted leave to report for active duty at Fort McClellan, Ala., for six months, as a 2nd Lieutenant in the Chemical Corps. The news is that he has recently been promoted at Polaroid to the rank of Research Associate.—*L. F. Hamilton, Correspondent, M.I.T., 4-254, Cambridge, Mass. 02139*

VI

Karl E. Sterne, S.M.'54, is Vice President, Marketing, of InterAccess Corporation, a new firm which he founded in company with its President, Tod Morcott, and Executive Vice President, Arthur W. Dana, Jr., to engage in computer conversational time sharing. During the early months capital had to be raised and the operation planned. Their operating system called SUMMIT (Supervisor of Multi-programming, Multi-processing Interactive Time-sharing) is claimed to be the first piece of software to do all that. Early this year a batch processing operation was under way, and the company expects to be in full conversational operation by May. Offices have been set up in Palo Alto and Los Angeles and additional offices are planned for San Francisco, New York, Washington and Boston by the end of 1969. Mr. Sterne brings extensive industrial experience to his new venture, having been Computer Sales Manager for Beckman Instruments and Marketing Manager for Kaiser Aerospace and Electronics Corporation, in which latter position he was in charge of sales, advertising, contract administration and market planning.

After this item was sent to the *Review* Mr. Sterne informed us, under date of March 22, 1969, that he has resigned his position with InterAccess to become President of Protect Systems, Inc., a new company launched by InterAccess to protect credit-card holders. For an annual fee of five dollars, the credit cards are registered, listed on the computer, and if lost or stolen a stop order is immediately telegraphed to the issuer at the holder's request. InterAccess retains a minority interest in Protect Systems.

Paul Chorney, S.M.'58, E.E.'60, Sc.D.'61, is Visiting Associate Professor at his Alma Mater, Brown University, this academic year where he is teaching courses in energy conversion and circuit theory as well as engaging in solid-state and microwave research. He is on leave of absence from Microwave Associates, Inc., of Burlington, Mass., where he is Director of Tube Research. His work involves primarily experimental and theoretical studies of electron devices for the generation, amplification and control of microwave power. From 1966 to 1968 he was Guest Professor of Electrical Engineering at Northeastern University in Boston.

Sergiu Samuel, S.M.'55, Chief Engineer for Electronic Systems and Reliability in the Israel Aircraft Industry, returned to the United States to attend the National Reliability Symposium in Chicago January 21-23. On the way home he stopped off to renew acquaintance with friends at M.I.T. and in the local area. Following his studies at M.I.T. he joined Telemeter Magnetics of Los Angeles, Calif., now a part of Ampex Computer Division. In 1957 he returned to Paris and worked with Compagnie des Machines Bull, manufacturers of Computers.

In July 1957, he married Miss Christiane Lemouzy whom he had first met when they were both students at Ecole Speciale de Mecanique et d'Electricite in Paris 1949-51. Moving to Tel-Aviv, Israel, early in 1960 he with some local partners started an electronics company, and in 1962 he became Consultant to the Israel Ministry of Defense and Aircraft Industry. In 1965 he joined the Israel Aircraft Industry on a full time basis where as Chief Engineer, he is responsible for three groups; the first deals with electronic systems or avionics, the second with airborne power problems and the third group, which he organized and runs, with reliability. Since 1962 Mrs. Samuel has operated an office representing electronic and industrial manufacturers including E G & G. Professor Edgerton made two visits to the Samuels, one shortly before the June War and one soon after. The Samuels have a seven year old daughter, Daphne and a four year old son, Remi.

Albert E. Cookson, S.M.'51, has been promoted to General Technical Director of the International Telephone and Telegraph Corporation. Shortly after receiving his M.I.T. degree he joined I.T.T. Federal Laboratories and became Director of the Missile Guidance Laboratory where he supervised the development of guidance, countermeasure and telemetry systems for the Meteor, Lacrosse and Talos missiles. In 1959 he was made Vice President and Director of Operations of the Data and Information Systems Division and in 1962 he became President and General Manager of the newly formed I.T.T. Intelcom and was responsible for its contracts with the Department of Defense. In 1965 he was transferred to the headquarters technical staff as Deputy General Technical Director, which position he held until his recent promotion. Mr. Cookson was graduated from Northeastern University in 1943 with highest honor. He was a Navy Radio Officer during the Second World War and then entered employment in the M.I.T. Research Laboratory of Electronics.

Donald K. Ross, S.M.'48, of the firm of Ross and Baruzzini, Inc., in January addressed a dinner meeting of the St. Louis Chapter of the American Society of Heating, Refrigeration and Air-conditioning Engineers. Under the topic "Total Energy" he discussed the design, installation and maintenance of total energy plants and reviewed his experiences relating to the design of many completely automatic total energy systems as large as 5,000 kilowatt capacity, and a feasibility study on a plant several times this size. He is an adviser on the Building Research Advisory Board of the National Academy of Sciences and is on the Governor's Science Advisory Board. His undergraduate work in electrical engineering was completed at the University of Minnesota in 1946. He has a doctorate in industrial engineering from Washington University in St. Louis.

Frank A. Leith, S.M.'61, E.E.'65, has joined KEV Electronics Corporation of Wilmington, Mass., as Manager of Device Development. The company is engaged in the exploitation of the ion implantation process for producing solid state devices. Previously he served as Group Leader for Ion Physics Corporation's device development group in the solid state division, and most recently was Acting Manager for the firm's Corning program. Mr. Leith completed his undergraduate work at the University of Cincinnati in 1959 and, during his period at M.I.T., served as an engineer in the Electronic Systems Laboratory and as a Research and Teaching Assistant in the Electrical Engineering Department.

Kurt J. Linden, S.M.'61, E.E.'63, is Senior Engineer in Raytheon's Infrared and Optical Research Laboratory which is a part of the Special Microwaves Devices Operation in Waltham. He is currently working on the development of long-wave-length infrared detectors and making a study of lead-tin telluride. About a

year ago he developed an indium arsenide laser having an infrared output of 3.18 microns wavelength and a spectral width of about 60 angstroms. Dr. Linden foresees applications of this laser in studies of biochemical reactions and radiation effects on tissue as well as in communications. He completed his undergraduate work in 1959 at the University of Utah and received the Ph.D. degree in electrical engineering at Purdue University in January 1966.

Joseph K. Dillard, S.M.'50, and Clarence J. Baldwin, Jr., E.E.'57, have coauthored several papers on electric power systems, the latest being "The future role of breeder reactors in utility planning" in the March, 1969, *IEEE Spectrum*. This article was based on a paper presented at the 1968 World Power Conference held in Moscow, U.S.S.R. August 20-24. Earlier joint papers were on economic development of mine-mouth power plants, EHV transmission and nuclear generation in the United States in 1964 and on system simulation in 1960. Both engineers are with Westinghouse Electric Company. Mr. Dillard is Manager of the Electric Utility Engineering Department and is responsible for the Company's engineering relationship with electric power companies all over the world and for technical and economic investigations, looking 10 to 15 years into the future. His current programs include the Apple Grove EHV Test Project involving voltages up to 750 kV, high-voltage underground transmission, and computer applications to power systems. Mr. Baldwin is Manager of Development, Advanced Systems Technology, and directs consulting work for utility customers and development projects in generation, transmission, and distribution system engineering.

Charles A. Steinberg, S.M.'57, has been elected a Vice President of Ampex Corporation, Redwood City, California according to a note in the *Wall Street Journal* of February 7. He is General Manager of Ampex' Videofile Information Systems Division. His undergraduate studies in electrical engineering were at the City College of the City University of New York.—**Karl L. Wildes**, Correspondent, Room 10-303A, M.I.T., Cambridge, Mass. 02139

XIII-A

Robert V. Laney, M.S.'44, has been appointed a Director of the Associated Industries of Massachusetts. Bob is currently General Manager of the Quincy Division of General Dynamics Corporation and has been at Quincy since leaving the Navy in 1959. . . . **Gary Houtsma, Nav. E.'50**, is now Director of Continuing Education in Engineering at Northeastern University. Gary recently delivered a talk to the Northeastern Section of the American Chemical Society on Avoiding Obsolescence. . . . Rear Admiral **William Hushing, U.S.N., M.S.'44**, has announced that he expects to retire from the Navy in the near future. Bill is currently Commander, Portsmouth Naval Shipyard—a

post he has held for almost five years. . . . **John J. McMullen, M.S.'45**, was recently elected to the Board of Walter Kidde & Co. John will continue as president and chief executive of the United States Lines Co., which was merged with Kidde this year.

Robert C. Sprague, M.S.'23, a Trustee and member of the Executive Committee of MITRE Corporation, recently received an award from the Massachusetts Bankers' Association for "outstanding industrial enterprise and significant contribution to the economic progress of the Commonwealth of Massachusetts." **Louis H. Roddis, M.S.'44**, has been appointed vice chairman and director of Consolidated Edison Co., effective April 2. Lou has been director of nuclear activities for General Public Utilities Corp., and chairman of G.P.U.'s Pennsylvania Electric Co., a position he was appointed to while deputy director of the Atomic Energy Commission's reactor development division.—**Robert E. Stark**, Secretary, 64 Pine Way, New Providence, N.J. 07974

XVI

The *Review* apologizes to Professor Wrigley and the readers of this column for the mystifying "blooper" in the March issue. The article on Rear Admiral Townsend, '43, appears below in toto.

A couple of months ago we gave you a rundown on the career of one of our high-ranking Navy graduates, now we follow up with another. Rear Admiral **Robert L. Townsend, '43**, graduated from the Naval Academy in 1934. After two years afloat he was ordered to Pensacola, and in 1937 was designated a Naval Aviator. Then followed three years on the *U.S.S. Lexington* with Bombing Squadron 2. In 1940 he returned to Annapolis to study Aeronautical Engineering, the continuation of which led him to M.I.T. Following a bit of shipyard duty, he then joined the newly commissioned *U.S.S. Tripoli* as Exec. The *Tripoli* operated in the Atlantic first, as a member of a hunter-killer group, then joined the First Fleet in the Pacific, where she did everything from transporting planes and Japanese prisoners, to "Magic Carpet" duty returning troops home to the U.S.

Post-war assignments took him all over, from air stations to the War College to the Pentagon, and in 1959 to command of the *U.S.S. Kearsarge*. The following year saw his selection as Rear Admiral, and the next month he took over command of Carrier Division Seventeen, and later, Division Six. In 1966 Admiral Townsend was designated Commander, Naval Air Systems Command, whose responsibilities include the entire spectrum of development, production, and support of all naval and marine aircraft and air weapons systems. That's a rather all-inclusive and awesome charge.

As these notes are being written **Rusty Schweickart, '56**, and Colonel McDivitt

are giving the Lunar Module its first test in space, playing tag with *Dave Scott*, '62, back home in the Command Ship. It seems appropriate, therefore, to lead off with a couple of men who have had a hand in the development of that unique vehicle. While *James W. Neighbours*, '41, was a student he accepted a commission in the Navy, and for the next 21 years saw duty as an Aeronautical Engineering Duty Officer and a Naval Aviator. Retiring at the end of 1961, he then became President of Agawam Aircraft Products in Sag Harbor, N.Y., turning out hydraulic assemblies and precision machined parts for aircraft and space vehicles. Three years later Grumman bought Agawam, which merely meant a change of title for Mr. Neighbours. He is now Manager of Grumman's Sag Harbor Plant 32. And to get back to the Lunar Module, among his products are some electro-mechanical assemblies of undisclosed nature which are carried on board. Jim would welcome visits from any of his old friends who happen to be in that part of Long Island, either at the plant or in nearby Southampton where he and Mrs. Neighbours live with their three children.

The other man with more than a spectator's interest in the performance of the LM is *Donald F. McAllister*, '58, staff engineer in the Space Guidance Development Section of TRW Systems. "Our section is concerned with development and testing of guidance equations for the LM Abort Guidance Systems, Lunar Orbiter, etc. At TRW I have been primarily concerned with testing of the flight equations for the LM Abort Guidance System, development of an error analysis computer program for strapdown inertial systems, and alignment and calibration techniques for inertial systems."

Milton Beilock, '49, started out with North American's Space and Information Systems Division in California. He held a variety of supervisory positions there in engineering, project management and marketing until 1961, when he left to join Cal Tech's Jet Propulsion Lab as Assistant Project Manager of the Surveyor Program. Three years later he came back East to Huntsville as Assistant Manager of the Northrop Space Laboratories where he stayed until June, 1966, when he became Director of Engineering at SPACO, still in Huntsville.

Since graduation from Penn State, in 1943, Colonel *William W. McKenna* has had a long and varied career with the Air Force. In the early 1950's he came to M.I.T. for work in Inertial Guidance and Control, receiving his S.M. in 1953. After a tour at Wright Field he returned to M.I.T. as Air Force Liaison Officer, picking up an E.A.A. while he was here. Back at Wright Field as an Associate Professor at the Air Force Institute of Technology, he also found time for graduate work at Ohio State and in 1966 was awarded the Ph.D. in aeronautics and astronautics. From there he went to Hq. AFSC at Andrews AFB as Assistant for Hypersonic Flight Technology. And in case you should be under the misapprehension

that the Colonel spent all of his time in the classroom, he also managed to log 3,400 hours of flying time of which 1,400 was in jet aircraft.

It isn't often a man suggests we "skip the first 26 years of my work in the airplane industry," but that's just what *Robert A. Darby*, '34, did suggest. So let's start with what he calls his "West Coast era." It began back in 1960 when he joined Boeing's Airplane Division. "I have been in the Preliminary Design Group—now Product Development—all the while. For something over four years I was in a sector known as Exploratory Design, but am now on a project within Product Development. Lately I have been looking at high-lift boundary layer control as a possible "trade" for other things. This is a subject which has always been of great interest to me. I reflected not long ago that the seminar I conducted at M.I.T. was on high lift. At the time it seemed to lack some of the lustre of instrumentation, which Professor Draper was just getting started, but I have found out that it is fundamental—and tricky, too. The present application is one I have never considered before. The payoff is not yet apparent, but I have faith that it is there." The Darbys have two daughters, one a graduate of the University of Washington, the other a Junior at Smith. "She is a small boon to United Air Lines." Those of you who lived in Graduate House will appreciate a few words Bob had to say about his own stay there. "My memory of the Graduate House is a most pleasant one. It was, I believe, newly instituted in 1933-1934, my year at Tech. I realize now how much effort Dr. Ashdown put into those enjoyable Wednesday night dinners. He chose after-dinner speakers who presented a wide range of interesting subjects. If I live to be 100 I shall not forget the talk on psychic research by a one-time physics professor at M.I.T. and Cambridge." Most of you know, I am sure, that Dr. Ashdown retired some years back, and that Graduate House is now Ashdown House.

Another Boeing man in a completely different field is *John T. Strickland*, '40, who came to us after graduating as a Mechanical Engineer from the University of Colorado. "Since those pre-World War II days of 1939 and 1940 I spent five years at Wright Field in the Dynamics Lab involved in aircraft flutter and dynamic load measurements. During this time I had many business and non-business associations with fellow Tech men such as *Bob Hage*, '40, *Court Perkins*, '41, *John Aldridge*, '39, and others. After the war I went to work for Fairchild Engine and Airplane Company on their Navy Lark Program. During this five-year period, from 1946 to 1951, I spent most of my time on the flight test end of the Lark Program at N.O.T.S., China Lake, and NAMTC, Pt. Mugu, as Test Engineering Manager and as Test Department Manager.

"In early 1951 I left Fairchild and came to Boeing in Seattle where I have been ever since. Here at Boeing I have worked all

these years without ever working on one of Boeing's famous man-carrying aircraft. My time has all been in engineering management assignments on the Bomarc and Minuteman programs, and in the past several years in the new business activities of the Space Division." John said that he had every expectation of staying with Boeing and in the Seattle area, having "acclimated myself to the great Pacific Northwest and to my many associates at Boeing and the community."

Like so many other Navy men, Captain *John T. Kearns*, '53, has put in time in the Western Pacific. He was variously skipper of the *U.S.S. Massey*, of the *U.S.S. Vandiver*, in the Navy's Special Projects Office, on the staff of COMCARDIV TWO, at the Armed Forces Staff College, and headed the Ships Operations Branch in the Office of the Deputy Chief of Naval Material (Logistics). "One tour in West PAC netted me a Bronze Star with 'V' and a Vietnamese Gallantry Cross." Sorry to say John gave no further details on this last item. It could have made good copy.

Wonder how many of you "look back with nostalgia to the relaxed atmosphere and pleasant time spent at Tech." Commander *Robert H. Small*, '58, is one who does. Of course everything is relative, and Bob has had some rather busy years since he was with us. "After leaving M.I.T. I reported to the Staff of Commander Cruiser Force, U.S. Atlantic Fleet, where I served in Guided Missile, Ordnance, and Nuclear Weapons billets. This was followed by a tour as Weapons Navigator aboard the *Polaris* Missile firing ship *U.S.S. Observation Island*. Here I was able to put your Inertial Navigation and Gyro Mechanics courses to good use, since I was responsible for the proper operation of two SPERRY MK 1 SINS's. After that tour I was assigned as Executive Officer of the destroyer *U.S.S. Abbot*. This was followed by another very pleasant academic year as a student at the U.S. Army Command and General Staff College at Fort Leavenworth, Kansas. In 1964 I was assigned to the Office of the Chief of Naval Operations at the Pentagon, as Assistant for Surface Missile Systems in the Strike Warfare Division. From Washington I went to the destroyer *U.S.S. Du Pont*, home ported in Norfolk, Virginia, and assumed command in December 1966. Since leaving Cambridge our family has increased by one with the birth of a second son, Andrew, at Patrick Air Force Base, Florida, in 1960. We celebrated his arrival with the firing of a *Polaris* at sea off Cape Canaveral."

Commander *William D. Dittmar*, '55, retired from the Navy in 1967 and immediately joined the Advanced Technical Staff of the Marquardt Corp., but in the previous 12 years he, too, had been around a bit. Directly after graduating here, he was assigned to an Air Development Squadron at Pt. Mugu as project pilot in the evaluation of air-to-air and air-to-ground missiles and weapon systems. After that he spent a couple of

years with an All-Weather Fighter Squadron, then went to Livermore, Calif., on liaison duty with the A.E.C. From 1962 to 1966 he was in Washington as Assistant Program Manager of the F-111B, and his final tour was as Attack Aircraft Class Desk Officer for the Commander, Naval Air Forces Atlantic. In September 1967 he started his second career, now as a civilian.

A graduate of Tufts in 1934, *Frederick T. Smith* went into the Navy as an Aircraft Maintenance Engineer, and when the war ended he came to us. After getting his master's in 1948 he stayed on here in the Instrumentation Lab for three years, then went west looking for greener fields. (As these notes are being written we're in the middle of the worst snowstorm in ten years. Traffic everywhere is at a standstill, and the radio is jammed with no school, no work, and meeting cancellation notices. At the moment those "greener fields" of California seem mighty attractive.) Following three years at North American Aviation, Fred joined the RAND Corporation as a member of the research staff, Guidance and Orbit Mechanics Group, Electronics Department. His work there involved mathematical analyses of a variety of ballistic missile and space flight guidance problems. At the same time he did graduate work at UCLA in Celestial Mechanics, Automatic Control Theory, and Applied Mathematics, and in 1965 received his Ph.D. That same year he left RAND and joined General Precision in Glendale, Calif., as a senior staff engineer in the Librascope Group. For the uninitiated who may think this has something to do with libraries, (a new scanning device?), let me set the record straight. Fred's work has to do with fire control systems and other ASW problems.

Turning from the Navy to the Halls of Learning, we find *David L. Kohlman*, Ph.D.'63, heading the new Department of Aerospace Engineering at the University of Kansas. Aerospace courses were formerly combined with Engineering Mechanics, but enrolment grew so rapidly that it was imperative it be made a separate department. The Dean of the School of Engineering and Architecture predicted that in five years Aerospace might well have the largest enrolment in the entire school.

From Arlington, Va., we hear from *Edwin N. Myers*, '61: "In July 1965, I retired from the Air Force after 22½ years service, the last four of which were spent on the Air Staff in DCS R&D. On the Air Staff I was responsible for laser and over-the-horizon radar programs. In October 1965, I received a Civil Service appointment in the Office of the Secretary of Defense. My assignment is as a Staff Assistant to the Assistant Director of Defense Research and Engineering (Communications-Electronics). The areas of responsibility are the R&D programs in Night Vision, Infrared and Laser systems and techniques. "While my responsibilities are not in the control and guidance area, I have found that my course at Tech

has been extremely valuable. This is because it was so comprehensive that it is easy to adapt to new responsibilities."

In 1958 *Frank L. Williams*, '55, joined the R&D group at Huntsville as a member of the Army Ballistic Missile agency staff. When N.A.S.A.'s George C. Marshall Space Flight Center was established two years later he transferred to it and was Deputy Director of the Future Projects Office. From there he went to Dr. von Braun's office as his assistant, and in 1965 was appointed Director of the Advanced Systems Office.

R.C.A. is designing the communications equipment to be used by astronauts in lunar landings, allowing them to communicate with one another and with mission controllers on earth, and right on top of the program is *Carl Alexoff*, '56. Carl left the Avionics Division of the Bureau of Naval Weapons to join R.C.A. in 1960. He was Program Manager for the Communications Subsystem of the Ranger TV Program which secured the first high resolution photographs of the moon's surface. Last year he was named Program Manager for R.C.A.'s Vehicular Communications Systems. So when the first men to wander over the face of the moon are chatting back and forth they will have Carl and his cohorts to thank for that ability. The Alexoffs live in Cherry Hill, N.J. "According to statistics the N.J. Turnpike is one of the heaviest traveled roads in the world. I am sure some of you must travel it periodically. We live near Exit 4, so the next time you are on it, pull off the road and give us a call—better yet, pay us a visit."

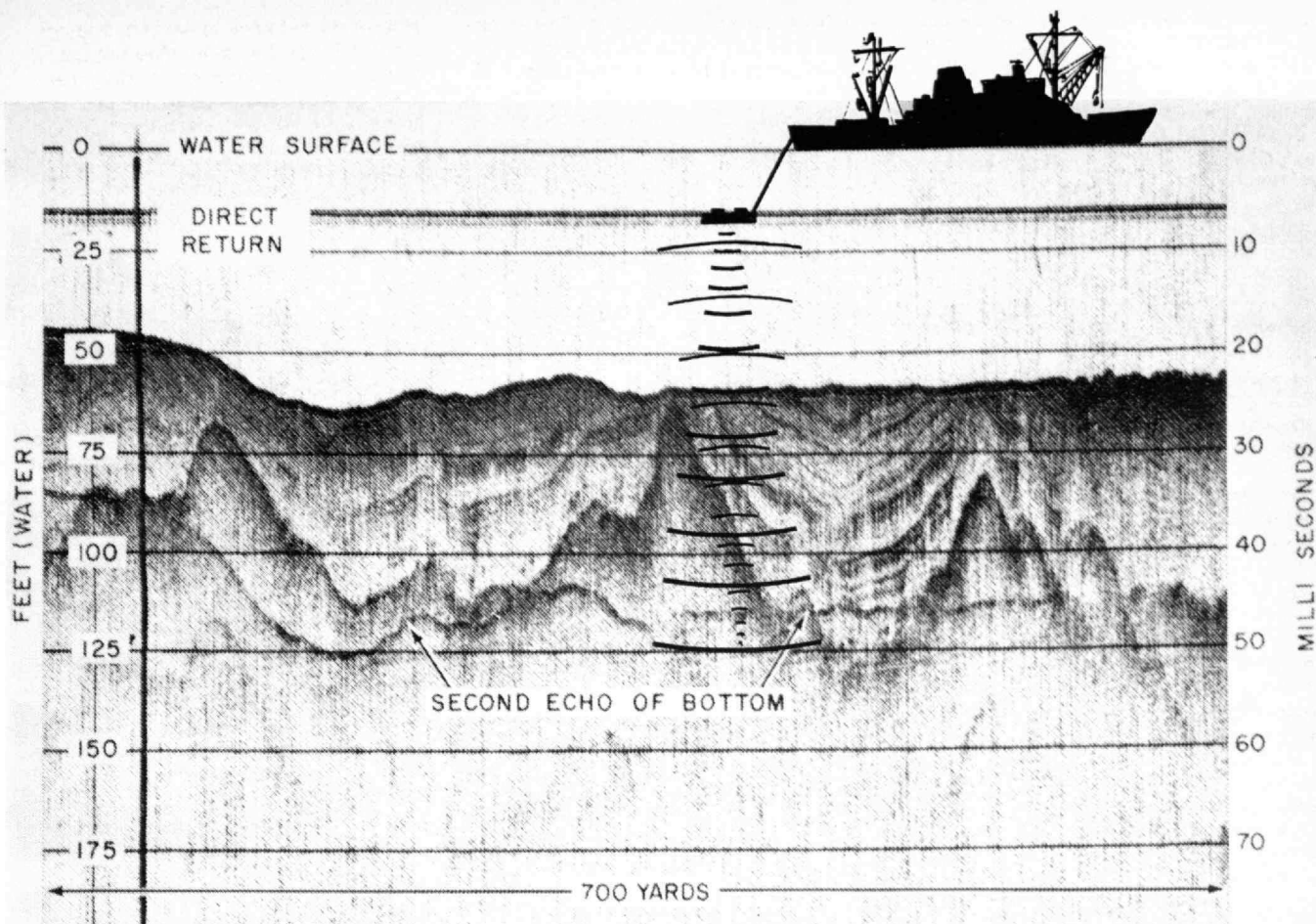
Frederick C. Gray had seven semesters as an undergraduate in Course XVI, then left us for the University of Washington. He returned, however, and in 1961 was awarded an S.M. He is with TRW Systems in Redondo Beach, Calif., working on propulsion, orbit determination, and trajectory analysis, but frankly I can't understand how he can possibly find time to go to the office. If you are one who thinks he has a multitude of interests, just listen to this. "I was married in April 1965 to the former Margaret Shinn of Franklin, La., who works as a TV and movie actress under her maiden name. We live on the Palos Verdes Peninsula and pursue many interests. When not before the camera Margaret enjoys entertaining guests with dinner parties, landscaping and gardening, raising tropical fish and interior decorating. I occupy myself with caring for a new house, reading history, writing, and soaring. We both like to go sailing, ski, hike in the local mountains, cycle, play tennis, and travel. A joint project coming up is to erect and operate a 10-inch reflecting telescope on an embankment behind our house. All this will change, of course, should we be blessed with children."

By this time (the writing of these notes is never a continuous thing), the boys have successfully put the LM through its paces, and all three are back together in the Command Ship holding a reunion.

When they get back to earth it is to be assumed that they will celebrate with something more appropriate than distilled water from a plastic squeeze bottle.—*Professor Walter Wrigley*, Correspondent, IL3-419, M.I.T., Cambridge, Mass. 02139

Sloan

Carl F. Franz, '52, has been elected Vice President-General Manager of the Schwitzer Division of Wallace-Murray Corp., effective January, 1969. . . . *George B. Stone*, '58, has been elected to the Board of Directors of Pfizer Laboratories. . . . *C. Victor Meyer*, '67, has been appointed Vice President, Product Management and Planning for the Friden Division of the Singer Company. . . . *Cal Perrine*, '68, after a world tour with classmates which included a meeting with officials from the Soviet Union's Committee on Science and Technology, has returned to his duties at N.A.S.A.'s Apollo Spacecraft Program in Houston. . . . *Goff Smith*, '53, was named President and chief operating officer of Amsted Industries Inc., last January. Amsted is a diversified producer of railroad equipment and other products. . . . *Robert C. Sprague*, '58, authored an article, "Steady, Moderate Growth Keeps Electronics Lively," which appeared in the Boston *Herald Traveler* of January 29.



Profile chart furnished by Prof. Harold E. Edgerton of Massachusetts Institute of Technology.

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